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Coal Operators as Agents of the Public

By R. DAWSON HALL.

MUCH like the rest of us, the coal operators are opportunists and often seek to avoid trouble by a somewhat too-ready compliance with unreasonable demand.

When the mine workers approach them with a demand for a six hour day and a five day week, with a 60 per cent advance in wages, and accompany that demand with a threat that the mines will be nationalized if the operators resist, no wonder that some of them tend to weaken in their opposition and show a readiness to deliver over to the mine workers all that is demanded.

Every mine executive is, at first, disposed to fight the mine worker's program to the last ditch, still remembering the days when such resistance was extremely profitable because labor was not yet in the hands of a nation-wide trust. By getting a rate lower than that of his competitor, one operator could undersell the other. But with the advent of the labor unions everything has changed. Resistance now seems to some to be only a folly, a sacrifice to the public which the public has not sufficient clearness of vision to support by its sympathetic interest and approval.

The operator now sees that if he concedes what the mine worker demands the public will be obliged to pay the additional cost of production as the natural outcome of competitive conditions, while if he fails to make concessions and thus permits a nation-wide strike the government will step in and take away his property on the ground that the public must have coal.

The mine workers have well timed their trouble-making. They will strike on Nov. 1, when the consequences of the delay in buying coal and mending railroad cars begins to be keenly felt and when winter, with its sharp, frigid mornings, warns us of the danger of being insufficiently supplied with fuel.

The public has not shown any interest in its own defense, why should the operator put his property in jeopardy in defense of the careless public? If he concedes the wage increase he appears before the world as a generous paymaster; if he refuses it, he is to be rated as an inhumane niggard and his property seized by the state.

It is for the consumer to speak and speak plainly, for it is he who will pay the bill. In 1914, inside day labor at the mines was paid \$2.84 per day of eight hours; on Nov. 1, 1919, that same labor is seeking to receive \$8 per day of only six hours. Thus the pay to inside day labor at the close of 1919 would be 3-3/4 times as much as in 1914, whereas the cost of living, which alone could excuse this increase, has advanced barely 75 per cent. But this is not all. The new way of reckoning what constitutes a day will make a further decrease in service and therefore a further advance in the cost of production.

In 1914 outside day labor got \$2.24 per day of eight hours, and on Nov. 1, 1919, if it gets all its demands, it will receive \$6.96 per day of six hours or 4 1-7 times as much as in 1914. The world is not growing in power of production as fast as these large increases of wage would seem to indicate. In fact, the men whose wage ambitions have been recorded are known to be actually less efficient than ever before.

Let the public show the operators that it stands firmly at their back in their defense of the cause of the public. Let public opinion everywhere announce that it will not for a moment suffer such unconscionable profiteering from any trust, labor or other. Firmly let the public declare that it will never, with the threat of nationalization of the industry, strike down the operator simply because he tries to perform his duty to society in resisting excessive wage advances and reduced working time.

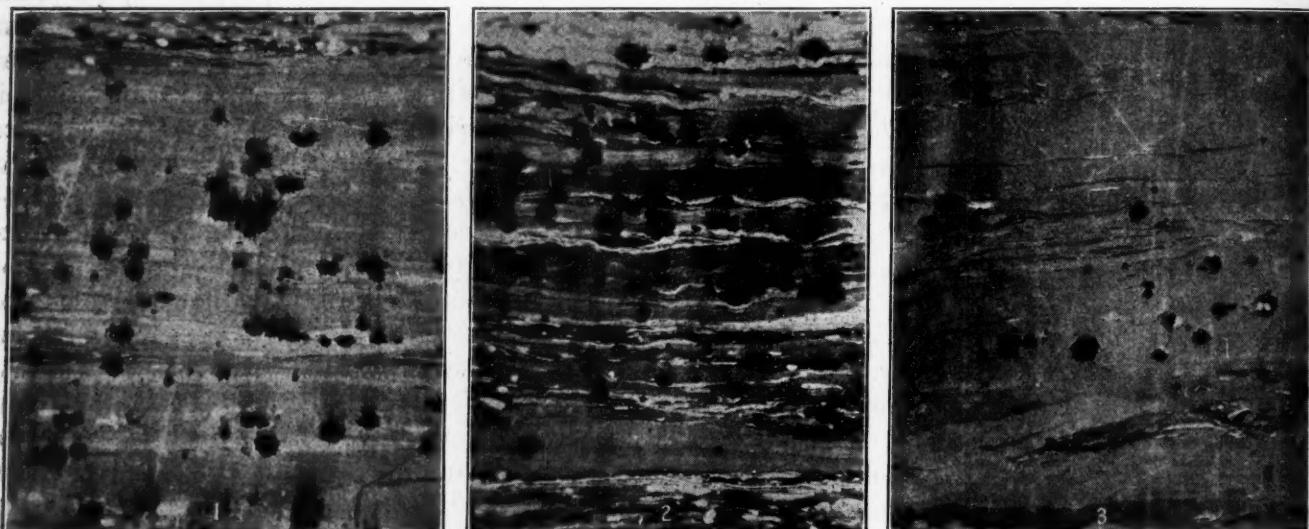
Occurrence and Origin of Finely Disseminated Sulphur Compounds in Coal*

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SYNOPSIS—Sulphur occurs in coal as pyrite in two general forms—sulphur balls or lenses, and as minute particles scattered through the mass. All coals so far examined contain these microscopic particles. It would appear that their presence is due to the sulphur originally contained in the plant matter from which the coal has been evolved.

UNDER sulphur in coal is usually understood that form of sulphur which is combined with iron and known as pyrite. It occurs in the form of balls, lenses, nodules, continuous layers, thin sheets, or flakes, both in horizontal planes and vertical cleavage fissures. But pyrites also occur as fine microscopic particles, or nodules, disseminated through the compact coal. This

amount of sulphur in very small globules, or particles, of pyrite. These particles are seen in a thin section as roughly rounded opaque dots (Figs. 1 to 10.) When isolated, they are generally shown to be approximately spherical in shape, with a rough outer surface. They vary in diameter from a few microns¹ to a hundred microns, the majority measuring from 25 to 40 microns; relatively few exceed the latter diameter. They are, therefore, extremely small objects. Their size is best appreciated by comparing the illustrations, in which they are shown at a magnification of 100 diameters, with some known area like the period used in the ordinary printed page. The period is about 0.6 mm. in diameter, and when magnified 100 times, will cover a circular area of about 2½ in. in diameter. Frequently a number of these particles are joined together in horizontal rows; occasionally, a number are grouped together into small lenticular masses or into irregular



FIGS. 1 TO 3. CROSS-SECTIONS OF COAL FROM INDIANA AND ILLINOIS

Fig. 1—Thin cross-section of coal from Vandalia mine No. 82, near Terre Haute, Ind., No. 5 bed, showing a thin layer of anthraxylous coal with numerous microscopic pyrite globules. Pyrites globules are shown black as irregular roughly rounded areas. Many have been partly broken and fragments, consisting of minute cubes, have been dragged to some distance over the section. Anthraxylon is that part of coal derived from parts of logs, stems, branches or roots. $\times 100$. Fig. 2—Thin cross-section of coal from Vandalia mine No. 82, near Terre Haute, Ind., from strips of anthraxylon embedded in an attritus or debris. Black, roughly round areas represent microscopic pyrite grains; white irregular strips represent cuticles; and short linear patches represent spores. Tendency of pyrite globules is to form rows along thin strips of anthraxylon. Attritus is that part of coal derived from all sorts of macerated plant parts and plant products. $\times 100$. Fig. 3—Thin cross-section of coal from LaSalle, Ill., showing a thin layer of anthraxylous coal, including a number of pyrite globules. $\times 100$.

form has had but little consideration. Finally, there is sulphur in coal in an amicroscopic form (not visible with an ordinary microscope), probably combined with the organic matter that exists in the coal. This form has had considerable attention from a scientific standpoint, but has probably not been recognized sufficiently on the economic side. One or the other, or both, of these two latter forms may comprise the larger part of the sulphur content of coal, especially after it has been washed or otherwise prepared for use.

All coals that I have examined contained a varying

groupings. Occasionally a number have coalesced into one compact and irregular shaped mass.

During the process of preparing the coal sections, many of the globules break into innumerable small cubical fragments, which usually form a streak on either side of the globule. These are so small that it requires a very high magnification to distinguish one from the other. This is shown in almost all the illustrations, but particularly in Figs. 1 and 2.

The amount of pyrite in this form varies considerably in different beds from which coals have been examined and also in different samples from the same

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¹A micron is a unit of length equal to 0.001 millimeter, or about 0.00004 inch.

bed, or even in different parts of the same section. A section without these pyrite particles is rarely obtained; so far, no regularity has been discovered. Some of the coals examined contained, on the whole, relatively large amounts, others only small amounts. There is more finely disseminated pyrite in the coal from the Vandalia mine No. 82, of the No. 5 bed, in Indiana, than in any of the other coals studied. Figs. 1 and 2 show common appearances. All sections of this coal contain scores of pyrite particles, and in some laminae they are so numerous that it is impossible to cut sections. This finding is in harmony with the analysis of the coal from this bed, which shows from 2.46 to 4.21 per cent. of sulphur.

SULPHUR CONTENT OF ILLINOIS COALS

The Illinois coals from beds No. 6 and No. 2, containing from 0.50 to 6.79 per cent. sulphur, by analysis, as far as they have been examined, do not contain nearly as much pyrite in this form. Nevertheless, there is hardly a section made in which none is observed. As in the Vandalia coal, it is here irregularly distributed. Similarly, in some sections, the globules are so numerous that it is difficult to cut a satisfactory section from it. Normal appearances of some of the Illinois coals are shown in Figs. 3 to 5. Different coals from the different beds of Illinois have not been compared in this respect.

The coal from the Pittsburgh seam, analyzing from 0.78 to 2.83 per cent. sulphur, apparently, contains less pyrite in this form than the Illinois coals. It is of general occurrence, however, and, on the whole, an appreciable amount of the sulphur is present in this form of pyrite. A sample of coal examined from the Sipsey mine in the Black Creek Bed, Alabama, analyzing from 0.83 to 1.27 per cent. of sulphur, shows similar contents (Fig. 6).

All the sub-bituminous coals and lignites examined from ground sections revealed globules of similar form and appearance. Fig. 7, of a sub-bituminous coal from Stone Canyon, California (4.48 to 4.95 per cent. sulphur by analysis), represents average conditions of the sections examined. Some of the samples of lignites were found to contain relatively large amounts of it. Fig. 8 shows less than the average conditions.

The largest number by far of the pyrite globules are found in the anthraxylon of the coal—that is, that part of the coal derived from the woody portions of plants—although a considerable number are distributed through the attritus, or débris. The pyrite globules are readily distinguishable from the resinous inclusions of the anthraxylon, in that the pyrite globules have a yellowish glistening appearance and are opaque, while the resinous inclusions are dull and are at the most slightly translucent. They are also distinguished from resinous globules by their outline, which is usually rough, or ragged, while the outline of the latter is usually smooth.

A certain amount of sulphur has been found to be present in coal in an amicroscopic form. Although, in certain samples, no sulphur can be detected ordinarily by the microscope, microchemical and qualitative chemical tests reveal sulphur. When such samples are burned, in some cases, their ashes show sulphur by microchemical tests. Also, recent observations and analyses of a large number of samples from different coals have shown that, in a number of cases, more sul-

phur is found than can be accounted for if this material were combined only with the minerals found in coal. This form of sulphur is probably that recognized as organic sulphur. Little or nothing is known of organic sulphur and it is not even positively known that sulphur exists in this form. But there are a number of observations on record that lead one to assume that it is present as such.

Prof. T. G. Wormley,³ of the Ohio State Geological Survey, was apparently the first to call attention to the fact that many coals that contain but little iron have a large percentage of sulphur, a larger amount than could be accounted for if it were combined only with the iron found in the coal. His experiments go to prove that a large part of the sulphur found in coals exists as some organic compound, the exact nature of which he was not able to determine. A few years later a number of analyses made by Andrew S. McCreathe⁴ for iron and sulphur show that the sulphur in most cases is largely in excess of the amount required to convert the iron into iron pyrite. In only two instances did all the sulphur seem to exist as bisulphide of iron.

Kimball⁵ a few years later reviewed the whole field of sulphur in coal, and concludes that some of the sulphur may be combined with the organic matter of coal, the same as it is supposed to be combined with rubber in vulcanized rubber. Drown,⁶ in the effort to develop a better method for the determination of sulphur in coal than was in vogue at that time, incidentally observed, among other interesting results of his analyses, figures that led him to believe that sulphur must exist in coal as organic sulphur.

Little work has been done since on the organic sulphur in coal until recently, when the work was resumed in the coal laboratory of the Pittsburgh Station of the Bureau of Mines, as already referred to. At about the same time, the study was resumed in the Engineering Experiment Station, University of Illinois, by Parr and Powell,⁷ with results that led to the conclusion that sulphur exists as organic sulphur in coal. It is, therefore, highly probable that sulphur, like nitrogen, is still present in organic compounds similar to those existing in living plants.

SOME DOUBT AS TO ORIGIN OF PYRITE

The origin of the pyrite in coal is a matter of much speculation. The consensus of opinion appears to be that it must have been deposited by circulating waters or by seepage through the superincumbent rocks. Both sulphur and iron are found in underground waters. If in the form of sulphates originally, the organic matter of the coal is supposed to have reduced them to sulphides. The possibility that the sulphur in coal may have had its origin through the plants that contributed to the coal appears to have received but little consideration, although some admit of the possibility.⁸ That this is not improbable will be shown in the following consideration of sulphur in plants.

Sulphur is an essential element in almost all proteins

³Some Theoretical and Practical Conclusions on Coal. Geological Survey of Ohio (1873) 1, 360-364.

⁴Second Geological Survey, Pennsylvania, Report of Progress in the Laboratory of the Survey. M (1874-75) 30-32, and Report MM (1876-78) 123-126.

⁵Transactions (1880) 8, 181-204.

⁶Transactions (1881) 9, 656-663.

⁷A Study of the Forms in Which Sulphur Occurs in Coal. In Press. Engineering Experiment Station, University of Illinois.

⁸T. G. Wormley: *Op. cit.*
Editorial: Original Sulphur in Coal. *Coal Age* (1913) 4, 273-274; The Element Sulphur. *Coal Age* (1913) 4, 586.

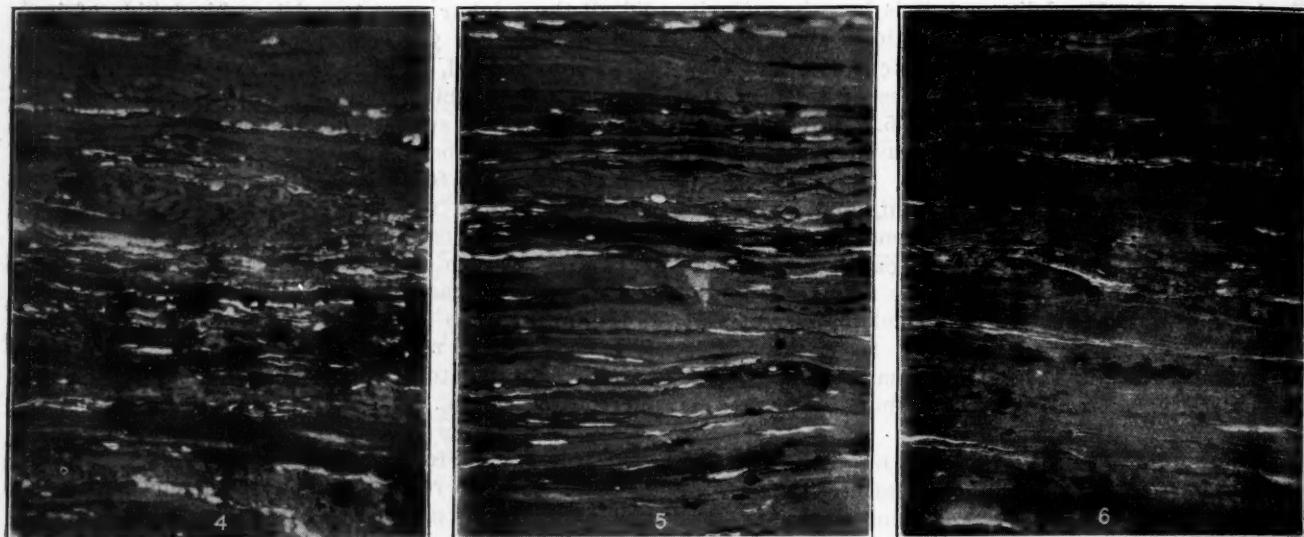
and proteins are essential to all living organisms—plants as well as animals. Being an essential element of proteins at once signifies its wide distribution and universal presence wherever there is life. Wherever there are, or were, peat-forming deposits there are, or were, living organisms; hence, wherever there are coal beds, whether lignites, sub-bituminous or bituminous, there was life and, therefore, proteins. The percentage of sulphur present in proteins may be small, but the universal presence of plants in large numbers and other living organisms, hence of proteins, must make the total amount of sulphur thus combined tremendously large. The proteins are, therefore, of great importance in the history and the chemistry of the sulphur found in coal.

Proteins are of such complex structure that their chemical investigation is a matter of extreme difficulty. Investigations are rendered even more difficult by the fact that, with a few exceptions, they do not crystallize, and cannot be distilled without decomposition. A num-

the same: Carbon, 51.25; hydrogen, 6.88; oxygen, 22.25; nitrogen, 18.69; and sulphur, 0.93. Other examples⁸ are:

| | Legumin of Pea, per Cent. | Edestin of Pea, per Cent. | Vignin of Cow Pea, per Cent. | Globulin of Cow Pea, per Cent. |
|----------|---------------------------------|---------------------------------|------------------------------------|--------------------------------------|
| Carbon | 52.20 | 53.3 | 52.64 | 53.25 |
| Hydrogen | 7.03 | 6.99 | 6.95 | 7.07 |
| Nitrogen | 17.90 | 16.30 | 17.25 | 16.36 |
| Sulphur | 0.39 | 1.06 | 0.50 | 1.11 |
| Oxygen | 22.48 | 22.34 | 22.66 | 22.21 |

Although relatively little is known of the structure of the proteins as a whole, after many researches and investigations the conclusion has been reached that they are built up of a group of amino acids. In other words, the amino acids form the foundation of protein just as bricks form the walls of buildings. Cystin is the one responsible for the sulphur in proteins; its formula is $C_6H_{12}N_2S_2O_4$. By hydrolytic cleavage with mineral acids, the sulphur of the protein substance is



FIGS. 4 TO 6. CROSS-SECTIONS OF COAL FROM ILLINOIS AND ALABAMA

Fig. 4—Thin cross-section of coal from Sesser, Ill., No. 6 bed, showing pyrite globules in dull coal, which here is composed of thin strips of anthraxylon and attritus; the latter includes spores, shown white. $\times 100$. Fig. 5—Thin cross-section of coal from Shelbyville, Shelby County, Illinois. Pyrite globules are distributed through whole section; here and there, several have joined and others have coalesced. Globules are somewhat smaller than in other sections shown. $\times 100$. Fig. 6—Thin cross-section of coal from Sipsey mine, of Black Creek bed, Alabama. Some pyrite globules have coalesced into lenticular masses, smaller globules are distributed through whole section. $\times 100$.

ber of groups of nitrogenous compounds are classed as proteins, making the number of proteins quite large; a few of the most important and best known are albumin, globulin, edestin, gladin and legumin. From a physiological standpoint, the proteins form well-defined groups, but from a chemical standpoint it is a difficult matter to define them exactly and to embrace each in well-defined limits. Although they may exhibit great differences in physical and chemical behavior, they do not differ much from one another in their chemical composition and the elements carbon, hydrogen, oxygen, nitrogen and sulphur, always present, vary only within small limits in the different ones, as shown in the following table: Carbon, 50 to 55 per cent.; hydrogen, 6.5 to 7.3 per cent.; oxygen, 19 to 24 per cent.; nitrogen, 15 to 17.6 per cent.; sulphur, 0.3 to 5 per cent. Some also contain from a trace to 0.5 per cent of phosphorus.

Different kinds of proteins from different sources give quite constant results within small limits. Albumin, for example, from a number of seeds and nuts was found to be similar in all cases and its composition was

regularly split off as cystin. The sulphur in this group is regarded as a derivative of hydrogen sulphide, since hydrogen sulphide and some methylmercaptan, CH_3SH , are split off in the putrefaction of proteins.⁹

While most of the sulphur in plants occurs in the proteins, a number of plant families contain other sulphur. In the mustard family, the sulphur is found both as nitrogenous substances, the oils of mustard, combined with glucose and other compounds to form glucosides, and as sulphides; while in the onion family, sulphur occurs only as sulphide.

Nine elements are regularly constituents of the ashes of plants—sulphur, chlorine, phosphorus, silica, potassium, sodium, calcium, magnesium and iron. Here and there a few other elements, like manganese and aluminum, are also present. The largest amounts of

⁸Thomas B. Osborn and George E. Campbell: Legumin and Other Proteids of the Pea and Vetch. *Journal American Chemical Society* (1896) 18, 583-609; (1897) 19, 494-500; (1897) 19, 509-513; (1898) 20, 348-375.

⁹Olof Hammarsten: Text-book of Physiological Chemistry. *Transactions by John A. Mandel*. Wiley, 1911.

sulphur are found in the ashes of plants or plant parts and organs rich in proteins, and in the ashes of the cruciferæ and the onions, rich in oils of garlic, oils of mustard and their glucosides. In the ashes of these plants, as high as 4 to 8 per cent. of sulphur are found, while the ashes of leaves contain usually from 1 to 2 per cent. of sulphur.

The wood of trees is generally low in ash content, but sulphur is a constant component in varying amounts. In some wood ashes it is found in considerable quantities; as in *Prunus mahaleb* or *Maheleb* cherry, 2.8 per cent. sulphur; *Morus alba* or white mulberry, 3.9 per cent. sulphur; and *Pinus strobus* or white pine, 3.7 per cent. sulphur. It should be noted in this connection that the percentage of sulphur in ashes is not a true index of the original content of sulphur in the plant from which they came, since a considerable part of the sulphur escapes during burning.

In a study of the sulphur in plants, it is necessary to make the deductions from the living plants, because it is only these whose chemistry can be studied. There is, however, every reason to believe that the chemistry of the plants of any geological period, whether of the Paleozoic, the Tertiary, the Cretaceous, or the Recent is the same. Paleobotany teaches that the plants of all ages, as far as can be learned from their anatomy, morphology and structure had the same kinds of organs, produced the same kinds of products and performed the same functions as those of today. The main difference in the plants of the different periods was that different phyla were represented more predominantly during the different times. During the Paleozoic times, the Lepidodendrons, the Calomites, and the Cycadophytes, plants to which the Lycopodiums or club-mosses, the Equisetums or horsetails, and the Cycads, respectively, of today belong, formed the bulk of the coal-forming plants.

PLANT FORMS HAVE SIMILAR CHEMISTRY

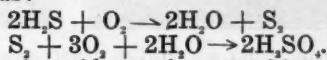
During Tertiary times, the Conifers or pines appear to have been the predominant coal-forming plants. Today both the conifers and the dicotyledonous plants—that is, the pines and ordinary leafy plants—are the peat-forming plants, while the horsetails and the club-mosses form but an insignificant part. A chemical study of all the different plants of the different phyla living today has shown that the chemistry of their products is similar. Cellulose, ligno-cellulose, protein, chlorophyl, etc., have a similar composition respectively, no matter in what plant they are found. There is, then, every reason to believe that the sulphur contents of the plants of any period were similar to those of the plants of today. It is also possible that certain plants of ancient times were particularly rich in non-protein sulphur, like the onion and the mustard families of today.

The sulphur in the higher plants must be taken in through the roots, or organs functioning as roots, as sulphates only. The sulphates may be in the form of calcium, magnesium and potassium sulphate. They must be reduced by the plant, but how and where this is done is not known. In the plant, sulphur is found chiefly as hydrogen sulphide derivatives, as in the cystin components of proteins and in sulphides, or sulphides combined with other substances in the form of glucosides. The plants must, therefore, carry out a sulphate reduction. The assimilation of hydrogen sulphide must

proceed rapidly, since it is a violent and most destructive poison to protoplasm.

Proteins yield hydrogen sulphide on putrefaction; likewise plants containing sulphides or sulphides in glucosides yield hydrogen sulphide and some mercaptan. Proteins and glucosides are relatively easily decomposed, yet a considerable amount of sulphur may have been retained in the original tissue as organic sulphur probably still as a sulphide. This would be indicated by the fact that a large amount of vegetable matter escapes putrefaction, as in peat formation and in the large amount of well-preserved plant tissue found in coals and lignites. But neither H_2S nor the sulphur of the plant that has escaped putrefaction is available to plants; in fact, H_2S is a deadly poison to them. It is, therefore, of considerable importance to know how sulphur in this compound can again be made available for plants or, in fact, how any form of sulphur other than a sulphate may be made available. This is accomplished through the intervention of so-called sulphur bacteria, of which there are several quite well-known groups.

While hydrogen sulphide is a violent poison to higher plants, certain lower forms, both bacteria and fungi, may utilize it as a source of energy. Well-known forms are *Beggeatoa*, *Thiophysa*, *Thiopirillum* and *Thiothrix*. *Beggeatoa* is the best known because of the studies of Winogradsky who finds that this organism occurs in all swamps in which the water and soil contain enough sulphates or hydrogen sulphide. The sulphate, however, must be reduced by means of putrefaction to H_2S before it is available; this is accomplished by any plant during its life and decay. It also lives abundantly in sulphur springs. H_2S is first oxidized to elementary sulphur, which is deposited in the protoplasm as amorphous sulphur, seen as highly refractive inclusions in the protoplasm. This sulphur is gradually oxidized in the organism to H_2SO_4 . There take place, therefore, two reactions within the body of *Beggeatoa*, which may be expressed thus:



The sulphuric acid set free combines at once with carbonates to form sulphates. These may be calcium sulphate, sodium sulphate, potassium sulphate, or magnesium sulphate, and perhaps iron sulphate, all of them available to the plant for another cycle. By this means, *Beggeatoa* derives its energy. In order that they may thrive, a constant supply of H_2S is necessary, which substance is usually furnished by decomposing vegetable matter. When the supply is plentiful, grains of sulphur are deposited in the protoplasm of the bacteria; when the supply is scarce, they are dissolved and oxidized to H_2SO_4 . A proper supply of oxygen is necessary for both processes. *Thiothrix* is a sessile form, whose habits and character are similar to *Beggeatoa*.

RED SULPHUR BACTERIA IS PRESENT

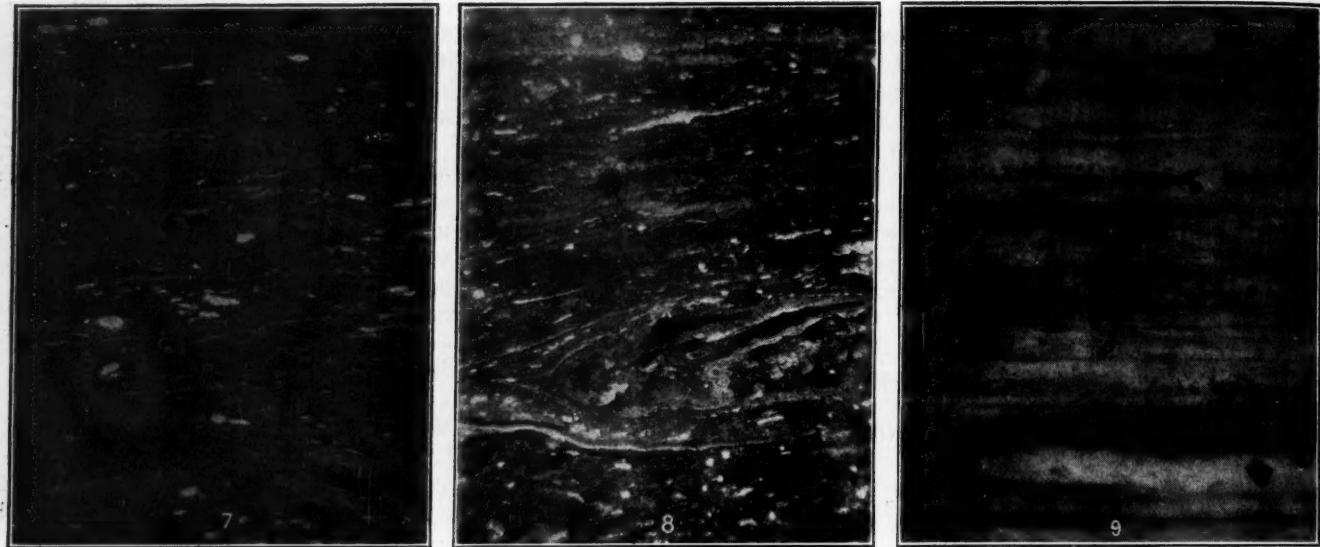
Other forms are the so-called red sulphur bacteria. These possess a red pigment, called bacteriopurpurin, which possibly has a function similar to that of chlorophyl in green plants. These bacteria can live in water rich in H_2S , and, in fact, are not killed in concentrated solutions of it. They are anaerobic. According to Winogradsky, they always live in company with other organisms containing chlorophyl, and hence are able to decompose CO_2 . The oxygen thus set free is available for the oxidation of H_2S to sulphuric acid.

The present state of our knowledge may be sum-

marized as follows: Plants contain sulphur largely in the form of proteins and during putrefaction sulphur is set free as hydrogen sulphide, a form that cannot again be directly utilized by plants; sulphur bacteria, on the other hand, oxidizes it to sulphuric acid, which immediately attacks the carbonates and changes them to sulphates. It is possible that other chemical reactions are going on without the intervention of bacteria. Hydrogen sulphide, in the presence of water in which any of the heavy metals are dissolved, will be precipitated as a sulphide, which may readily be oxidized to a sulphate. Ferric sulphate may be directly reduced by hydrogen sulphide to ferrous sulphate with a simultaneous precipitation to sulphur, and a further reaction of hydrogen sulphide, sulphur and ferrous sulphate slowly gives rise to ferric disulphide or pyrite. This reaction may be represented by the equation $\text{FeSO}_4 + \text{H}_2\text{S} + \text{S} = \text{H}_2\text{SO}_4$. But whether such reactions could take place under such strongly reducing conditions as exist in the peat bogs is doubtful.

of sulphur. Chemical analysis of peats from many sources show all the way from 0.29 to 4.21 per cent. It is, therefore, not far different from the nitrogen content. Iron is also invariably present in peat.

In previous studies on peats, lignites, sub-bituminous and bituminous coals, it has been shown that there is a continuous loss of cellulose substances and a relative concentration of resin, resin waxes and waxes. It is a difficult matter to make fair estimates as to how much of the original peat deposit has disappeared during the transformation from peat to coal. But observations made on the anthraxylon components—that is, components derived from wood in bituminous coals—show that these have been compressed or reduced to one-tenth to one-fortieth of their original mass. Let it be assumed that they have suffered a reduction to only one-tenth of their original mass, which is a conservative figure. Let it also be assumed that none of the sulphur contained in the peat bog has been removed, which is a fair assumption, since the consensus of opinion is that



FIGS. 7 TO 9. CROSS-SECTIONS OF COAL FROM CALIFORNIA, MONTANA AND WISCONSIN

Fig. 7—Thin cross-section of sub-bituminous coal from Stone Canyon, Contra Costa County, California. Coal shown consists of rather finely macerated woody matter, including resinous particles and cuticles, besides pyrite globules, shown in black. $\times 100$. Fig. 8—Thin cross-section of lignite from Montana. Section shown consists of macerated woody matter and other plant debris, including some spore and cuticular matter. Only two pyrite globules are shown. $\times 100$. Fig. 9—Thin section of woody peat, into minute cubical fragments. $\times 100$.

Sulphates are generally detected in peat, especially in the upper strata, by microchemical tests; in many instances they are present in relatively large amounts. Calcium sulphate appears to be the chief one in the peat bogs investigated. When peat is permitted to dry very slowly, calcium sulphate crystallizes out, in certain cases in relatively large quantities.

Sulphur is present in these bogs, irrespective of the horizon from which taken, whether from near the surface, halfway down, or at the bottom of a bog 10 to 12 ft. deep. Since the plants growing in a bog, in dense and luxuriant masses, subsist on the residue of the plant growth that preceded them, it is evident that the plants now living in the bog are not able to take in nearly all the sulphates contained in the deposit. There is, therefore, by far more total sulphur in the bog, in both the dead-plant and the living-plant matter than is needed for the cycle. There is thus an accumulation of sulphur. The peats upon which most of these investigations are based contain from 0.89 to 1.63 per cent.

all the sulphur contained in coal has been carried into the deposit from the outside. There could, therefore, not have been a loss. There are found in peats, according to the figures given above, from 0.29 to 4.21 per cent. of sulphur. If there were then only a reduction to one-tenth of the original mass, and no loss of sulphur, there would be from 2.9 to 42.1 per cent. of sulphur in the resulting coal. There is more than enough sulphur in peat to account for all the sulphur in coal.

Peats contain pyrite in the same form as found in the coals. As shown in Figs. 9 and 10, the pyrite nodules in peat are lenticular to spherical in form, with a rough surface, and often several are grouped together in a manner similar to the coal pyrite. They break up into minute cubes when the microtome knife strikes them in making the section.

Although the pyrite globules have not been investigated completely, their origin is of enough importance to be briefly considered. In samples of fresh woody peat are found numerous organisms living in the wood fibers or wood cells. They are stained brilliantly red by safranin, and are clearly differentiated from the

¹⁰E. T. Allen: Sulphides of Iron and Their Genesis. *Mining & Scientific Press* (1913) 103, 413-414.

peat substance, since resinous and dead peat matter do not take this stain well. They are, in general, of a spherical form and vary greatly in size within certain limits, but are not much larger than 30 or 40 microns.

Besides a transition in size, transitions in certain physical characters are noted. In color, they range from light pale yellow, through yellow, light brown, brown, dark brown, to black; simultaneously with the color, they range from transparent to opaque; and parallel to this there is a transition in staining qualities, from a stage in which they take a bright stain through stages in which the staining quality fades away together with an increase in natural color to a point where they are black and opaque, and where they will not take a stain. These stages of the various characters and qualities indicate that they represent different stages in the age of the organisms. Often all the stages may be observed in the same section or preparation. The black opaque stage, and the one that will no longer

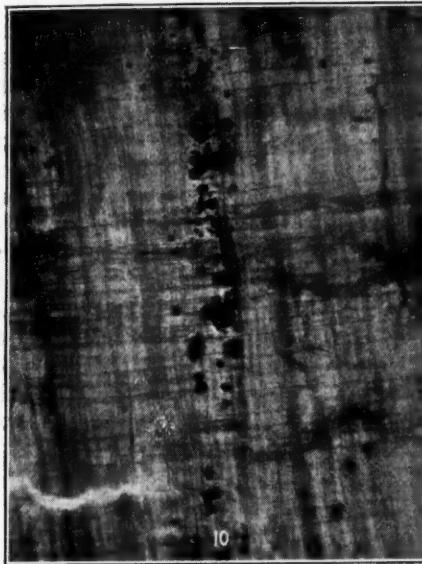


FIG. 10. CROSS-SECTION OF COAL FROM WISCONSIN

Thin section of woody peat taken from peat bog near Hayton, Wis., showing considerable number of pyrite globules lodged in wood fibers. It will be noticed that they are strung out in cavities of wood fibers.

admit of a stain, is the one that will break into minute cubes, and is the stage recognized as pyrite globules.

The organism is of the plasmodium type, and has been obtained, up to a certain stage, in pure cultures in proper culture solutions under anaerobic conditions. These organisms are evidently either sulphur bacteria or iron bacteria. Their study has not been completed and many points in their history and behavior have not been satisfactorily cleared up. They require further study, and the observations made on them need further verification.

There are then disseminated through the peats pyrite globules of microscopic size similar in appearance, form, and behavior to those in the coals; similar pyrite globules are disseminated through the lignites and the sub-bituminous coals. They can be traced clearly from the peats to the bituminous coals in a continuous chain. On those found in the peats, there appears to be evidence that they are of organic origin. There is, therefore, reason to assume that they are of the same origin in the lignites and the sub-bituminous coals, the next steps above peat in the succession of coal formation. If this is correct, then there is every reason to believe

that those in the coals are of the same origin.

All the coals that have been examined microscopically contain microscopic grains of pyrite disseminated through them. These are distributed irregularly and usually occur in colonies. Different coal seams vary in the total content of this form of pyrite; different horizons differ in the total content; and different parts of a section may differ widely in the number of globules present.

The majority of the globules are roughly spherical in form with a rough surface. They readily break into numerous minute cubes. Coals also contain amicroscopic sulphur, probably as organic sulphur. Although the presence of organic sulphur has been known for a long time its chemical form is not known.

SULPHUR PRESENT IN PLANT FORMS

Plants contain sulphur in two forms; as a component of proteins and as non-protein sulphur. The sulphur in proteins is universally present in all plants while the other form occurs only in certain families, but in some of these it occurs in relatively large amounts. On decomposition, the sulphur in plants is set free mainly as hydrogen sulphide.

The sulphur is taken in by the higher plants as a sulphate; hydrogen sulphide is not available and must first be oxidized to a sulphate. Hydrogen sulphide may be oxidized under strongly reducing conditions through the agency of sulphur bacteria, resulting in sulphates. All plant ashes contain some sulphur.

Sulphur is present in peat bogs from 0.29 to 4.21 per cent. Calcium sulphate often crystallizes out when peat is dried slowly. Peats contain pyrite in the form of microscopic grains, similar to those found in the lignites, sub-bituminous and bituminous coals. There is evidence to show that the pyrite grains in peat are of organic origin.

The reasoning on the origin of sulphur in coal applies to microscopic pyrite and organic sulphur; lenses, balls, and sheets of pyrite may have a secondary origin.

I am deeply indebted to A. C. Fieldner, supervising chemist of the Pittsburgh Experiment Station of the Bureau of Mines, for valuable suggestions and assistance in the work here described.

Successful Accident Prevention

That accidents can be reduced by precaution has been proved by the United States Steel Corporation from 1907 to 1918. That company estimates that the precautions instituted saved from serious injury in 1918 a total of 3094 persons who would have been injured if the physical and moral hazards had continued as they were in 1906. The saving in serious accidents from 1907 to 1918, both included, as estimated on the basis of the loss in 1906, totals 22,909.

With such a saving in accident who shall say that safety work does not pay big dividends in human happiness, steady production and lowered accident rates, the first being by far the most important of all profits? The showing would have been far more favorable than it is had the old method of computing the seriousness of accidents been maintained. But on Jan. 1, 1911, and thereafter a new classification of serious accidents was inaugurated, more accidents being reported and classified as serious than was formerly the case. This accounts for a slight increase in the accidents in 1911 and the two following years.

Coals of Ohio and Their Limitations for Byproduct Coke*—I

BY WILBUR STOUTT
Columbus, Ohio

IN OHIO, the annual output of coke made from native coals has averaged not more than 70,000 tons, or about enough to run a 200-ton blast furnace. Raw coal locally mined from the Sharon, or No. 1, bed was used for iron smelting in Mahoning furnace at Lowellville, Mahoning County, as early as 1846. This practice was continued in the Youngstown district until the coal became scarce and the Connellsville coke more popular. At present, the Sharon bed contributes a part of the fuel for the production of ferrosilicon iron at Jackson, Jackson County. However, coke from other states still has the preference.

In this state, coke, on a commercial basis, was first made in Jefferson County probably about 1861 or 1862. The coals used were the Steubenville Shaft, or Lower Freeport, and the Strip Vein or Middle Kittanning. The practice, however, was discontinued before 1880 because of the competition of superior foreign cokes. Beehive ovens, later built at Leetonia, Columbiana County, were operated for only a few years; the coal used at this place is the Lower Kittanning or No. 5. In a desultory way, slack from Pittsburgh coal has been coked at a few places in eastern Ohio, and attempts, either for experimental or for commercial purposes, have been made in other parts of the state. Small quantities of coke were made from the Upper Freeport coal at Salineville, Columbiana County, and near Nelsonville, Hocking County; the results were poor. Tests were made of the Middle Kittanning coal near Zanesville, Muskingum County, at Moxahala Furnace, Perry County, and at Washington Furnace, Lawrence County; the cokes were all high in sulphur and ash. Attempts were made to coke the Clarion coal at Vinton Furnace, Vinton County; a small battery of molding ovens and a pile of high-sulphur coke yet remain to tell the story. The Pittsburgh coal was coked on a commercial scale at Utley and at Lathrop, Athens County, but the operations were not successful and were soon abandoned.

These failures and indifferent successes are not to be attributed to a lack of demand for a first-class coke, as Ohio has held a commanding place for many years in iron smelting; nor do they arise from a deficiency of coals, as the state has a vast reserve of such material. They are to be described to the inferior quality of the native product offered to the trade. The cokes were too high in ash and sulphur or were wanting in structure. Some of the purest coals have but little cementing properties whereas others with high sulphur and ash have, at least, fair bonding proclivities. Further, Ohio coals are all high in moisture and volatile matter and, therefore, give low yields of coke. Broadly speaking,

this state has no coals available in large quantities and at a low cost that will make a first-class coke in the beehive oven.

The introduction of the retort oven, however, has changed the situation somewhat. Coals not successfully coked in the beehive oven may make a fair product in the byproduct oven.

Furthermore, mixtures of coals often give good results. Besides the coke, other products of value are also obtained and the yield of these is high with the highly volatile coals. In this state, the future prospects are good for the sale of the excess oven gas for domestic and industrial purposes.

The need for local coking coal in Ohio is urgent. The quantity of coal available for this purpose is large, but the quality is in general below the standard for coke making. Three beds, however, offer possibilities, and if these fuels are mixed with high-grade coals from other states a coke would result that would embody decided commercial possibilities.

poses as the supply of natural gas seems near exhaustion. The byproduct oven is a profitable investment in Ohio as attested by the number that have been built and are now under construction. These plants are widely distributed over the state, the kinds and locations being given in Table I.¹ Besides, there was under construction by the Domestic Coke Corporation, Cleveland, a 60-oven plant, of the Semet-Solvay type, with an annual coke capacity of 311,000 tons.

TABLE I. BYPRODUCT COKE PLANTS IN OHIO, JAN. 1, 1919

| Name of Company | Number of Ovens | Kind of Oven | Annual Coke Capacity |
|--|-----------------|--------------|----------------------|
| Cleveland Furnace Co., Cleveland..... | 100 | Semet-Solvay | 337,500 |
| Republic Iron and Steel Co., Youngstown..... | 134 | Koppers | 744,600 |
| Youngstown Sheet and Tube Co., Youngstown..... | 306 | Koppers | 1,425,000 |
| Toledo Furnace Co., Toledo..... | 94 | Koppers | 408,600 |
| United Furnace Co., Canton..... | 47 | Koppers | 204,400 |
| Hamilton Otto Coke Co., Hamilton..... | 100 | Otto | 168,000 |
| River Furnace Co., Cleveland..... | 204 | Koppers | 960,000 |
| LaBelle Iron Works, Steubenville..... | 94 | Koppers | 445,000 |
| Brier Hill Steel Co., Youngstown..... | 84 | Koppers | 379,000 |
| Portsmouth-Solvay Co., Portsmouth..... | 108 | Semet-Solvay | 559,000 |
| National Tube Co., Lorain, O..... | 208 | Koppers | 850,000 |
| Ironton Solvay Coke Co., Ironton..... | 60 | Semet-Solvay | 311,000 |
| American Steel and Wire Co., Cleveland..... | 180 | Koppers | 750,000 |
| Dover Byproduct Co., Dover, Ohio..... | 24 | Roberts | 100,000 |

These operations are all successful, although they are handicapped through having to haul their coals from points in Pennsylvania, West Virginia, and eastern Kentucky. When the additional expense of transporting coke over coal is considered, but little lowering of cost is gained by placing the ovens in the coal fields; moreover, the products are not there readily handled. In none of these plants have Ohio coals been used regularly, even as a part of the charge, except in the Roberts ovens at Dover. The only byproduct plant in Ohio using local coal exclusively is at Tunnel Hill, Coshocton County, which has been in operation about three years. In this a cannel coal obtained from the hills nearby is coked chiefly for its coal-tar products, the yield of which is high. The coke produced is not of metallurgical quality.

The chief coal-bearing rocks of Ohio are of Penn-

*First installment of a paper presented before the Chicago meeting of the American Institute of Mining Engineers, September, 1919.

†Assistant State Geologist.

¹List furnished by M. J. Tucker, Librarian, *Iron Trade Review*, Cleveland, Ohio.

sylvania age, although the deposits laid down during Dunkard time contain a few thin beds of low-grade fuel. The total thickness of such strata is, approximately, 1500 ft. Of this, not to exceed 70 ft. is coal, much of which is found in beds too thin to be of value except for local domestic purposes. The coal fields lie in the eastern and southeastern parts of the state and have a total area of over 10,000 square miles. The Pennsylvania system is divided into four formations, the Pottsville, Allegheny, Conemaugh and Monongahela; and the Dunkard series into two, the Washington and Green. These formations are further subdivided into

TABLE II. STRATIGRAPHIC RELATIONS

| Formation | Member | General Description | Thickness |
|----------------|------------------------------------|---|--------------|
| | | | Ft. In. |
| Dunkard Series | Washington "A"..... | Coal, thin, unsteady..... Interval..... | 2 0 60 0 |
| | Washington..... | Coal, persistent, shaly..... Interval..... | 5 0 65 0 |
| | Waynesburg "A"..... | Coal, impure, rather steady..... Interval..... | 2 0 38 0 |
| | Waynesburg, No. 11..... | Coal, persistent, shaly..... Interval..... | 3 0 60 0 |
| | Uniontown No. 10..... | Coal, locally developed..... Interval..... | 3 0 107 0 |
| | Meigs Creek, Sewickley, No. 9..... | Coal, persistent..... Interval..... | 4 0 34 0 |
| | Pomeroy, Redstone, No. 8a..... | Coal, locally developed..... Interval..... | 4 0 30 0 |
| | Pittsburgh, No. 8..... | Coal, persistent..... Interval..... | 5 0 188 0 |
| | Harlem..... | Coal, persistent, but thin..... Interval..... | 1 6 28 0 |
| | Barton..... | Coal, thin, unsteady..... Interval..... | 1 0 29 0 |
| Conemaugh... | Anderson..... | Coal, persistent, thin..... Interval..... | 2 0 23 0 |
| | Wilgus..... | Coal, locally developed..... Interval..... | 3 0 56 0 |
| | Mason..... | Coal, unsteady, thin..... Interval..... | 1 0 30 0 |
| | Mahoning..... | Coal, persistent, usually thin..... Interval..... | 1 0 37 0 |
| | Upper Freeport, No. 7..... | Coal, locally developed..... Interval..... | 5 0 45 0 |
| | Lower Freeport, No. 6a..... | Coal, unsteady, usually thin..... Interval..... | 3 0 41 0 |
| | Middle Kittanning, No. 6..... | Coal, persistent..... Interval..... | 4 6 31 0 |
| | Lower Kittanning, No. 5..... | Coal, locally developed..... Interval..... | 3 0 27 0 |
| | Clarion, No. 4a..... | Coal, unsteady..... Interval..... | 3 6 24 0 |
| | Brookville, No. 4..... | Coal, thin, unsteady..... Interval..... | 3 0 22 0 |
| Allegheny... | Tionesta, No. 3b..... | Coal, usually thin..... Interval..... | 4 0 17 0 |
| | Bedford..... | Coal, unsteady, in places cannot coal..... Interval..... | 2 0 14 0 |
| | Upper Mercer, No. 3a..... | Coal, unsteady..... Interval..... | 3 0 36 0 |
| | Lower Mercer, No. 3..... | Coal, thin, unsteady..... Interval..... | 2 6 74 0 |
| | Quakertown, No. 2..... | Coal, locally developed..... Interval..... | 3 0 87 0 |
| | Sharon, No. 1..... | Coal, unsteady..... Interval..... | 3 0 20 0 |

members. The chief stratigraphic relations are shown in Table II, in which the average thicknesses of the coals in the main fields and not for the total area are given. The intervals separating the beds are normal for the state.

The Pottsville, the oldest formation in the Pennsylvania system, extends southward from Trumbull and Geauga Counties, on the north, to the Ohio River, on the south, in Scioto and Lawrence Counties. The belt varies from 10 to 40 miles in width but averages only about 15 miles. This formation is nearly 250 ft. thick and contains at least ten well-defined coal beds, of which, however, only four have been mined for railroad shipment; in fact, only two beds have been extensively worked. In general, the quality of the Pottsville coals is excellent, but they have little coking properties.

Sharon or No. 1 Coal.—The Sharon, or No. 1, coal, lies on or not far above the Sharon conglomerate, the basal member of the Pottsville formation. Its position is also about 90 ft. below the Quakertown, or No. 2, coal. It is confined to two small areas, one in the northern part of the state, centering around Massillon, Stark County, and the other in the southern part, lying near Jackson, Jackson County. In these fields, the bed is broken into somewhat isolated and irregular pockets, which causes trouble and expense in mining. The Massillon is by far the larger and more important area and embraces parts of Stark, Wayne, Summit, Portage, Medina, Mahoning and Tuscarawas Counties; only a small part of the area, however, contains coal. At present the field is only a small producer, as much of the coal has been exhausted. This fuel was formerly used quite extensively in the raw state for iron smelting in the Youngstown district. The following section is about typical for the bed:

| | Feet | Inches |
|---------------------------|------|--------|
| Shale and sandstone..... | 30 | 0 |
| Coal, Sharon..... | 4 | 6 |
| Clay, siliceous..... | 4 | 0 |
| Conglomerate, Sharon..... | 30 | 0 |

Where present, the thickness of the Sharon coal varies from 1 to 7 ft., but the usual measurement is between 3 and 5 ft. The bed is not regularly separated into benches by partings but in places it contains thin layers of bony material. Sulphur balls are uncommon. The roof is shale, strong and durable, and the floor is a siliceous clay, well able to support the weight of the overburden. Under such conditions a high yield of fuel is obtained from a given area. The average quality of the coal is shown by the following analysis: Moisture, 5.52 per cent.; volatile matter, 37.60 per cent.; fixed carbon, 52.84 per cent.; ash, 4.04 per cent.; sulphur, 1.17 per cent. In parts of the field, the sulphur is considerably below 1 per cent. The moisture, volatile matter and fixed carbon are rather constant and the ash seldom exceeds 6 per cent. The coal is open-burning and non-cementing and therefore not fitted for coke making. Moreover, the yield in the byproduct oven would be low.

In the Jackson district, the Sharon coal is confined to parts of Scioto, Liberty, Coal, Washington and Jackson townships, Jackson County and to Marion, Beaver and Jackson townships, Pike County. The total area is approximately 28 square miles of which not more than 15 square miles is left for future consumption. This is so broken, however, that but little of it could be mined in a large way. The following section is representative of the coal worked at present:

| | Feet | Inches |
|---------------------------|------|--------|
| Shale..... | 20 | 0 |
| Coal, good } Sharon..... | 2 | 9 |
| Coal, bony } | | 2 |
| Clay, siliceous..... | 1 | 0 |
| Conglomerate, Sharon..... | 40 | 0 |

The Sharon coal in the Jackson district varies from 2 to 5 ft. in thickness but averages close to 3 ft. The conditions for mining are good except that the coal lies on the uneven floor of the Sharon conglomerate and therefore contains rolls and dips. The composition is as follows: Moisture, 8.20 per cent.; volatile matter, 32.88 per cent.; fixed carbon, 52.55 per cent.; ash, 6.37 per cent.; sulphur, 0.49 per cent. The Sharon coal in the Jackson district contains less sulphur than any other coal in the state and on this account it has been

regularly used for many years for iron smelting. The ash is clay-like in character and in local areas of the field is high. The coal is non-coking and in every respect similar to the Massillon.

The unfortunate thing is that the supply of Sharon coal in either the Massillon or the Jackson district is scarcely sufficient to warrant the establishment of important works. Mixtures of this coal with a high cementing coal, for example standard Connellsville from Pennsylvania, should give a product of metallurgical quality. A half-and-half mixture of these two coals should give a yield of approximately 62.24 per cent. coke,² having an analysis about as follows: Volatile matter, 1.61 per cent.; fixed carbon, 89.56 per cent.; ash, 8.83 per cent.; sulphur, 0.90 per cent. No tests, however, have been made with such a mixture of coals

Jackson County, and the other near McArthur, Vinton County. The Wellston field, which has been worked since 1872, is by far the larger. The total area of the field is nearly 40 square miles, but not more than 15 square miles remains for future mining. In the part first worked, but now practically exhausted, the bed is 3 ft. to 4 ft. 6 in. thick, but in that now mined it will not average over 2 ft. 6 in. For domestic purposes, this fuel has had a wide reputation for many years. The quality of the coal is shown by the following analysis: Moisture, 9.29 per cent.; volatile matter, 32.96 per cent.; fixed carbon, 54.26 per cent.; ash, 3.49 per cent.; sulphur, 1.25 per cent.

The bed is quite free from shale or clay partings and from nodular pyrite. The roof is a tough shale and the floor a siliceous clay, both favorable for high yields in mining. For a thin coal, all the mining conditions are excellent. In the McArthur field, the members average about 3 ft. in thickness but the known area is only a few square miles. The quality of the fuel is excellent, being low in both sulphur and ash.

The Quakertown is one of the purest coals in Ohio and the structure of the bed is such that but little extraneous material is introduced into the fuel in mining. It is a free-burning, non-cementing coal and therefore is not suited for coke making. The cost of mining a thin bed and the small supply now known are also conditions unfavorable even for using it as a part of the burden. The Quakertown coal must be excluded from the list for making byproduct coke.

Lower Mercer, No. 3, Coal.—The lower Mercer, or No. 3, coal lies from 10 to 30 ft. below the Lower Mercer limestone and is unsteady in its extension across the state, being wanting in many places. Where present it is usually thin, seldom expanding to as much as 3 ft. In general the quality of the fuel is poor, as it is high in sulphur and ash. In a few places, cannel coal is present on the horizon. The Lower Mercer member has furnished no coal for railroad shipment and only small quantities even for local domestic purposes.

Upper Mercer, No. 3a, Coal.—The normal position of the Upper Mercer, or No. 3a, coal is about midway in the interval between the Lower Mercer and the Upper Mercer limestones. In the southern part of the state, the member is present with some regularity but in the central and eastern parts it is more uncertain. The thickness of the bed is seldom as much as 3 ft. and usually is below 2 ft. The quality of the fuel is generally good, as it is low in sulphur and ash. The Upper Mercer coal has been mined only for local domestic purposes.

Bedford Coal.—The Bedford member, also belonging to the Mercer group of coals, lies directly, or at most only 1 ft. or so, below the Upper Mercer limestone. It is unsteady in extent and thickness and variable in composition and structure. It is found in local areas



to determine the yield and structure of coke. The results may be unsatisfactory.

Quakertown, Wellston, or No. 2 Coal.—In ascending order, the next coal of importance in the Pottsville formation is the Quakertown, or No. 2, which is also known as the Wellston and Jackson Hill coal. It lies on the average about 90 ft. above the Sharon coal and nearly 100 ft. below the Lower Mercer limestone, which is a useful bench for reference. This coal is confined to two small areas in southern Ohio, one around Wellston,

²In calculations used in this paper involving Pittsburgh, or No. 8, coal from Pennsylvania its composition is assumed to be as follows: Moisture, 2.6 per cent.; volatile matter, 31.8 per cent.; fixed carbon, 58.64 per cent.; ash 6.96 per cent.; sulphur, 1.08 per cent. The yield in coke in the byproduct over is considered to be the fixed carbon plus the ash plus 1 per cent. for unexpelled volatile matter and deposited carbon from dissociated paraffins. The loss in sulphur is taken to be one-half or one atom of sulphur split off from the pyrite molecule.

in Muskingum, Licking, Coshocton, Tuscarawas, Holmes, Stark and Mahoning Counties. The best known field is in Bedford Township, Coshocton County, where it has excellent thickness over a few square miles and where it is represented by both cannel and bituminous coal. The thickness varies from 3 to 9 ft. but averages about 5 or 6 ft. The following section taken near the village of Mohawk, Coshocton County, shows the stratigraphic relations:

| | Feet | Inches |
|--------------------------------------|------|--------|
| Flint, gray, calcareous | 1 | 3 |
| Shale | 0 | 2 |
| Limestone, gray, shaly | 2 | 2 |
| Shale, gray | 2 | 8 |
| Flint, black | 1 | 9 |
| Coal, bituminous, with bony partings | 2 | 2 |
| Coal, cannel | 5 | 6 |
| Shale and covered | 14 | 0 |
| Limestone, Lower Mercer | 3 | 6 |

The bituminous coal occurring with the cannel is usually of poor quality as it is high in ash. The mining conditions are good. The quality of the cannel coal is shown by the following analysis: Moisture, 2.35 per cent.; volatile matter, 47.05 per cent.; fixed carbon, 37 per cent.; ash, 13.60 per cent.; sulphur, 2.33 per cent. At present this coal is coked by one plant chiefly for its coal-tar products; the coke is not of metallurgical quality.

Tionesta, No. 3b, Coal.—The Tionesta, the highest coal bed in the Pottsville formation, lies about midway in the interval between the Upper Mercer and the Putnam Hill limestones. It is unsteady, appearing in workable thickness only in small isolated areas across the state. The larger of these are found in Scioto, Jackson, Vinton, Tuscarawas and Stark Counties. In the best developed areas, the bed is from 3 to 6 ft. thick and is usually broken by one or more partings. At present, this coal is mined for railroad shipment only near McArthur in Vinton County. The section here follows:

| | Feet | Inches |
|----------------------------------|------|--------|
| Shale, calcareous, fossiliferous | 10 | 0 |
| Coal, part bony | 1 | 4 |
| Clay | 0 | 7 |
| Coal, part cannel | 3 | 8 |
| Clay, siliceous | 4 | 0 |

The Tionesta coal is usually high in ash that is clay-like in character. It is a free-burning fuel with little cementing qualities and therefore not suitable for coke making. Furthermore, the areas in which the coal has workable thicknesses are too small to yield the large quantities of fuel demanded for byproduct ovens.

(To be Concluded)

Two Blasting Cap Accidents

On Dec. 12, 1918, Jesse Mack, a coal loader, handed the shotfirer two electric blasting caps. As the latter was untwisting them, by pulling the wires through his hands, they exploded and the end of one of the caps struck Jesse in the eye, causing him to lose his eye.

On Apr. 16, 1919, Constanti Augustine was straightening out the wire on an electric blasting cap by holding the cap in one hand and pulling the wires through the other when the cap exploded, seriously injuring two of his fingers.

This second accident, quite similar to the first and apparently unexplainable, caused a careful investigation to be made of electric blasting caps and brought out the fact that a certain percentage of them could be

made to explode by holding the cap and giving a vigorous jerk on the wires that entered it.

It has been a common practice for men to hold caps in one hand and straighten the wires by pulling them through the other hand. This has been proved by the recent tests to be a dangerous practice. Stop doing it, or you will blow off a finger.

In some of the caps these wires are not firmly sealed and a vigorous pull causes them to slip inside the detonator. The fulminate of mercury with which the cap is loaded is so sensitive that the slight slippage of the wire inside the charge causes the detonator to explode.

Straighten out the wires on electric blasting caps carefully by first untwisting them, then by holding the wire in one hand some distance from the cap you can pull the remainder of the wire through your other hand and thus remove the bends and kinks.

Electric blasting caps are perfectly safe if carefully handled, but they are filled with an exceedingly sensitive explosive and must never be roughly treated.—*Mutual Monthly Magazine of Consolidation Coal Company.*

Seek Additional Appropriation for Collection of Coal Statistics

One direct effect of the Senate investigation of the coal situation has been to call nation-wide attention to the parsimony of Congress in withholding the appropriations for coal statistics. A strenuous effort was made earlier this year by Dr. George Otis Smith, the Director of the Geological Survey, to secure an appropriation to continue the more important statistics gathered by the Fuel Administration. The request was refused by the Appropriations Committee.

One of the first things which developed during the coal investigation was that neither the Railroad Administration, the coal operators nor the consumers had any definite idea as to the amount of coal in storage or of the amount which probably would be consumed during the coming winter.

At the request of Chairman Frelinghuysen of the special committee investigating coal, the Secretary of the Interior has approved a supplemental estimate for \$40,000, "for the collection by the U. S. Geological Survey of additional statistics of coal and coke production, distribution and consumption, including a special inventory of present stocks of coal and requirements for the winter of 1919-20."

The first deficiency bill already has passed the House but it is the intention, however, of amending the bill in the Senate so as to provide for the additional statistics.

To prevent interruption of rescue work following a mine disaster and to keep unauthorized persons from entering the mine or shaft, guards should be stationed at each opening and each opening should be roped off. It should be the duty of the guards to see that no person enters any opening with an open-flame lamp or without an official pass in the form of a check bearing a number. Records of these checks should be kept by clerks stationed near the mine entrance.—*Rescue and Recovery Operations in Mines.*

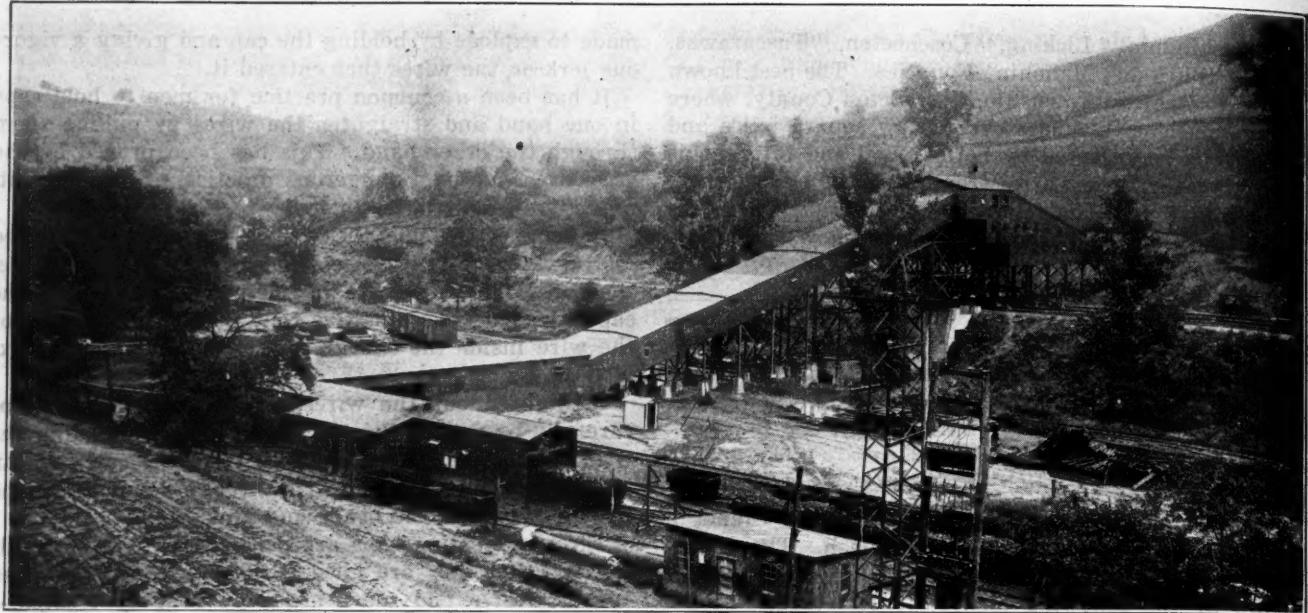


FIG. 1. GENERAL VIEW OF THE TIPPLE

New Coal Tipple of the Consolidation Coal Company

Built of Steel, It Embodies Many Modern Ideas in Respect to Safety, Simplicity and Efficiency

BY WILLIAM BRASACK
Fairmont, W. Va.

THE Consolidation Coal Co. recently completed a new and modern steel tipple to handle the output of three new mines

Prepares coal from three drift mines, and the ultimate capacity will be 5000 tons per day. The equipment is installed in duplicate, consisting of two equal and similar halves, only one of which is now working. The installation will be made in the second half when the output of the mines served renders this necessary. The design of the tipple is such that any combination of sizes of prepared coal may be loaded either separately or in combination.

known as Nos. 88, 89 and 90. This tipple, as well as the mines it serves, is located in the Fairmont coal region, near the town of Wyatt, W. Va., and is reached by the Western Maryland R.R. The bed of coal worked is the well known Pittsburgh Seam, which has an average height of 8 ft. at this point and is a good steam fuel with comparatively few impurities.

The mines are all drift operations, and the coal is brought to the tipple in trips of as many as forty mine cars, each having an average capacity of $3\frac{1}{2}$ tons. The railroad tracks at the tipple site are about 18 ft. higher in elevation than the mine car dumping point and are located about 300 ft. away on the opposite side of Bingamon Creek. This local situation called naturally for an elevating conveyor system.

The ultimate capacity of the tipple will be 5000 tons per day of 8 hours, and in order to handle this amount of coal it was decided to design the conveying and screening equipment double throughout, one-half only being installed for the present, until the mines are sufficiently developed to necessitate installing the rest of the machinery.

Fig. 1 is a general view of the tipple, and Fig. 2 shows what the arrangement of the entire equipment will be when the tipple is completed. The incoming trip

of mine cars is received by the trip feeder after the locomotive cuts loose and switches back over a separate track to take a trip of empties back to the mine. The trip feeder consists of a heavy 12-in. pitch strap chain with tilting conveying dogs spaced every 12 ft., running in substantial steel guides over a pair of sprockets. The head sprocket is driven through three gear reductions from a 15-hp. motor, the first reduction having cut teeth and a bakelite micarta noiseless pinion. The dogs of the chain engage suitable attachments that have been placed upon the mine cars. The large gear is connected to the head shaft by means of a special spring coupling, which absorbs the heavy shock and jar that occur when the trip is started. Fig. 3 shows the trip feeder in operation with the gear guards removed.

The trip feeder moves the mine cars at the rate of three per minute over the track scales, where their contents are weighed (without the cars stopping) by means of a quick-reading dial. They then run by gravity to the dump.

The dump is of the ordinary crossover type, connected with a single-horn car stop. It discharges the coal into a hopper located below in a concrete pit. After being emptied, the cars run by gravity over a kickback to the empty tripmaker. This apparatus is of a design similar to the trip feeder except that the conveying dogs are spaced only 4 ft. apart (see Fig. 4). The empty cars

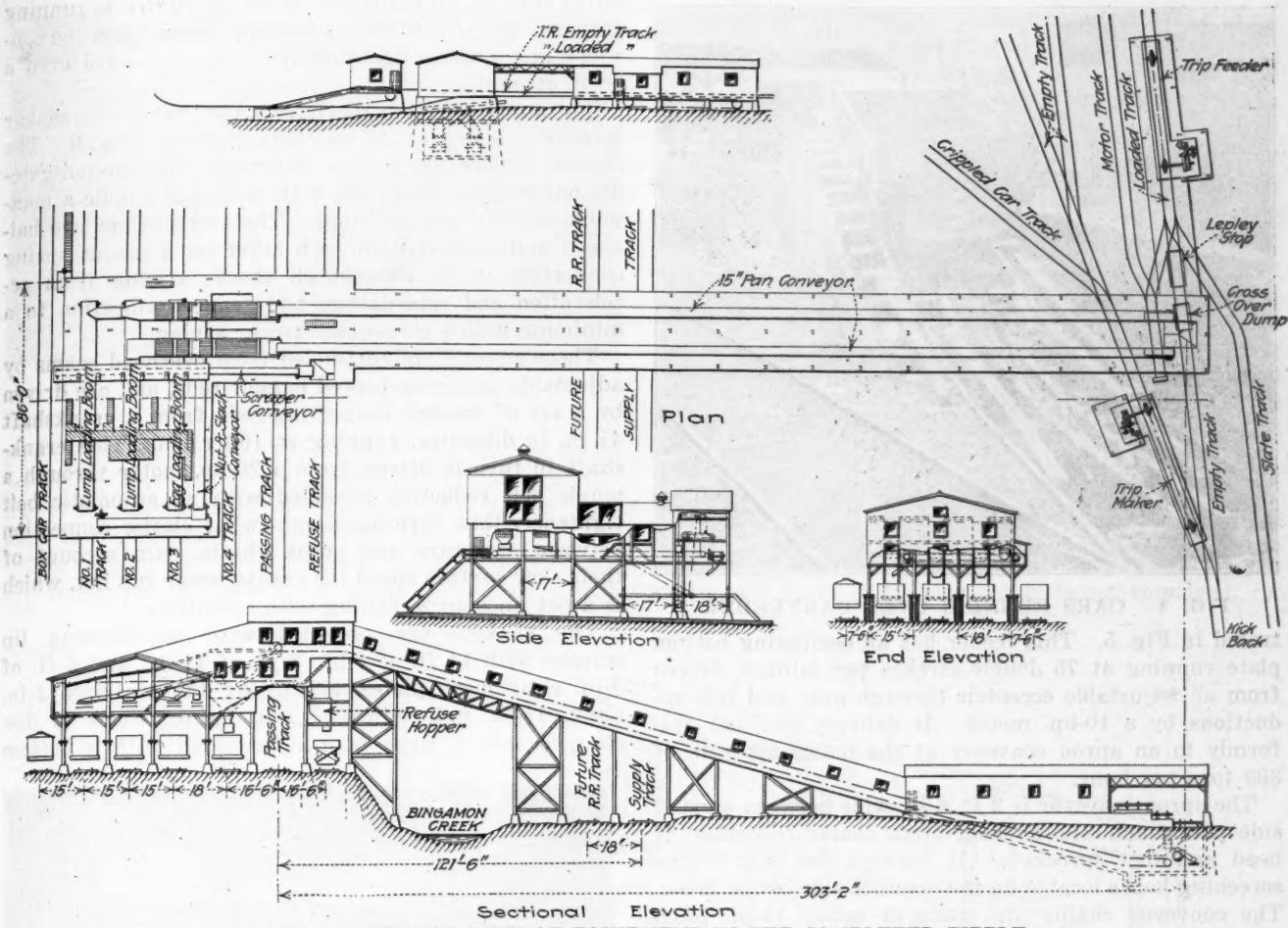


FIG. 2. ARRANGEMENT OF EQUIPMENT IN THE COMPLETED TIPPLE

run up grade through their accumulated momentum to a certain point, where they are kept from running backward by a pair of heavy tilting dogs, or so-called "grass hoppers," until picked up by the next conveying dog, which elevates the car to the level of the empty return

track and pushes it forward, thus making up an empty trip at a point accessible to the locomotives.

The hopper under the dump, acting as a distributing reservoir, has a capacity of 8 tons of coal. It has two outlets, each leading to a reciprocating feeder, illus-

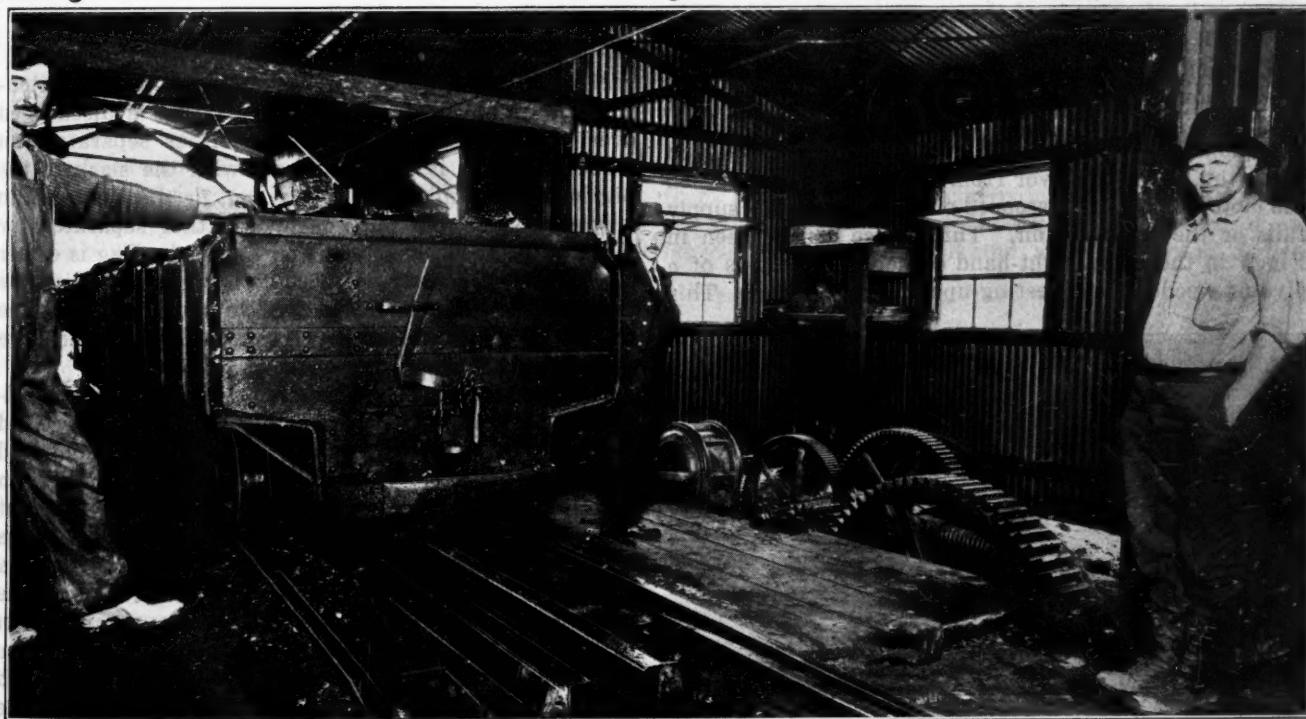


FIG. 3. TRIP FEEDER IN OPERATION (THE GEAR GUARDS HAVE BEEN REMOVED)

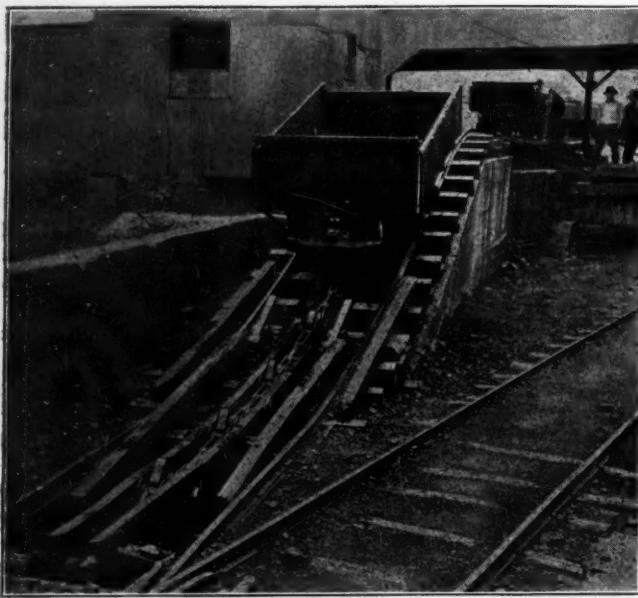


FIG. 4. CARS RUNNING OVER CARFEEDER

trated in Fig. 5. This feeder has an oscillating bottom plate running at 75 double strokes per minute, driven from an adjustable eccentric through gear and belt reductions by a 10-hp. motor. It delivers the coal uniformly to an apron conveyor at the maximum rate of 300 tons per hour.

The apron conveyor is 3 ft. 6 in. wide between moving side plates and 310 ft. long from center to center of head and foot sprockets. It conveys the coal to the screening house located on the opposite side of the creek. The conveyor chains are made of heavy 15-in. pitch steel links, with steel thimbles and pins, and provided with special roller-bearing supporting wheels running on T-rails carried on a steel frame, as shown in Fig. 6. The S-shaped pans and moving sides are built overlapping, thus making a dust-tight discharge (see Fig. 7). The head shaft is driven through two pairs of gears and a belt reduction from 50-hp. motor. The first (or primary) pair of gears is of the equalizing type, which reduces the jerky motion (inherent to all sprocket drives and especially noticeable with large-pitch chains and a small number of sprocket teeth) to a uniform movement.

A noiseless friction stop has been provided which keeps the loaded conveyor from running backward when the motor is purposely stopped or when the power supply fails or the belt slips off. This device can be seen in Fig. 7 in the lower right-hand corner. It consists of a pivoted wooden block resting upon a brake pulley. This

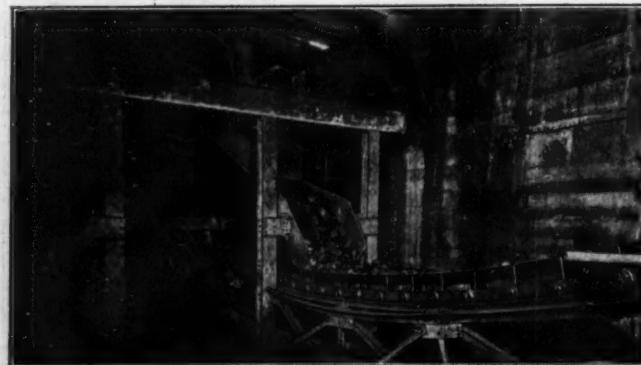


FIG. 5. RECIPROCATING FEEDER WITH OSCILLATING BOTTOM

offers little or no resistance when the device is running forward, but acts instantly and effectively when the conveyor stops, never allowing it to run backward even a small amount.

The apron conveyor discharges the coal to the shaker screens, a side view of which is shown in Fig. 8. The shaker screens are of the continuous bottom-and-gate-discharge type. They are 6 ft. wide and handle a maximum of 300 tons per hour. The two sections are balanced and connected to each other by a patent spring connection which absorbs all shocks arising from acceleration and retardation, and reduces vibration to a minimum with a consequent power saving.

These screens are suspended from overhead beams by adjustable and cross-braced hanger rods, and are driven by a set of wooden connecting-rods from a crankshaft 4½ in. in diameter, running at 100 r.p.m. This crankshaft in turn is driven from a 20-hp. motor through a single belt reduction provided with an automatic belt tightener, thus forming a somewhat elastic connection between armature and crank shafts. On account of their slow surface speed the cranks never run hot, which is a not uncommon failing with eccentrics.

The shakers are provided with self-cleaning lip screens with 14 ft. of 4-in., 8 ft. of 1½-in., and 6 ft. of 4-in. clear mesh plates, separating the coal into 4-in. slack, 1½-in. nut, 4-in. egg and lump. Slack is discharged into a large hopper, provided with a bottom

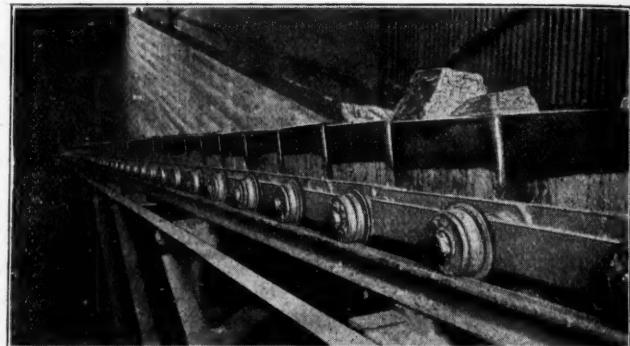


FIG. 6. ROLLER BEARING SUPPORTING WHEELS OF CONVEYOR

gate, and is loaded over an adjustable chute with extensions for low cars on track No. 4. Nut is discharged over a set of chutes and loaded either separately on track No. 3, or it may be mixed with the slack in the big hopper, or mixed with the egg, or discharged into a special slack and nut conveyor, either separately or along with the slack, for further disposal. Egg is either discharged separately on track No. 3 or mixed with the lump, while lump is discharged to track No. 2. The future (or second) shaker screen outfit will discharge the lump to track No. 1.

Picking tables of the apron conveyor type, with loading boom extensions, are installed over the egg and lump tracks. These tables are 5 ft. wide for lump and 4 ft. wide for egg. They are driven in two units from two 10-hp. motors through a train of gears, the first gear being cut and meshing with a bakelite micarta noiseless pinion. Each picking table is driven through a clutch and can be stopped and started individually. The picking space on each table is 20 ft. long. A partition to exclude dust separates the picking room from the screenhouse, and the former is well lighted through side windows and a skylight which extends over the whole room, as may be seen in Fig. 9, which shows the

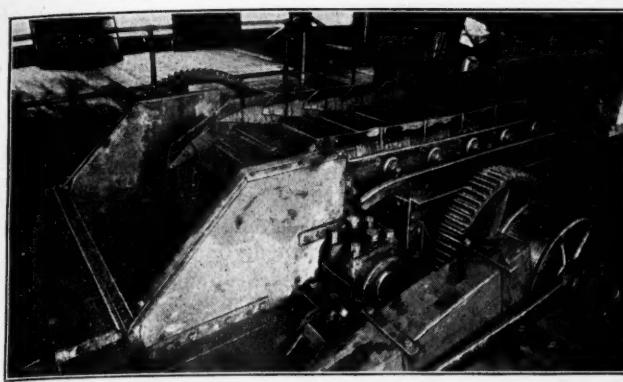


FIG. 7. OVERLAPPING SIDES OF CONVEYOR

picking house in course of erection. The loading booms are 28 ft. long from pivot to foot shaft, allowing loading into the bottom of railroad cars at a tipple clearance of 18 ft. above the top of the rail.

The loading booms are partially counterbalanced and are suspended by bails from hoists located on a floor

The discharge from the loading booms into the mixing conveyor is effected by means of a special hinged discharge chute which automatically, by means of a cam and roller device, swings into or out of place when the booms are raised or lowered.

A large bypass has been provided in the upper section of the shaker screens, which allows loading run-of-mine coal into the big hopper over track No. 4 in case the shaker screens should be out of commission.

Refuse from the picking tables is cast into small boxes or chutes and discharged through the picking-table floor into a refuse conveyor of the chain-and-scaper type. This runs directly under the floor of the picking room and carries the refuse back over the passing track into a hopper located over the refuse track, whence it is drawn through an undercut gate into a refuse dump car for final disposal.

All moving machinery throughout the tipple has been guarded by hand rails or special guards wherever there is a possibility of accident.

The steel structure is substantial throughout, H columns and heavy floor beams only being employed. A

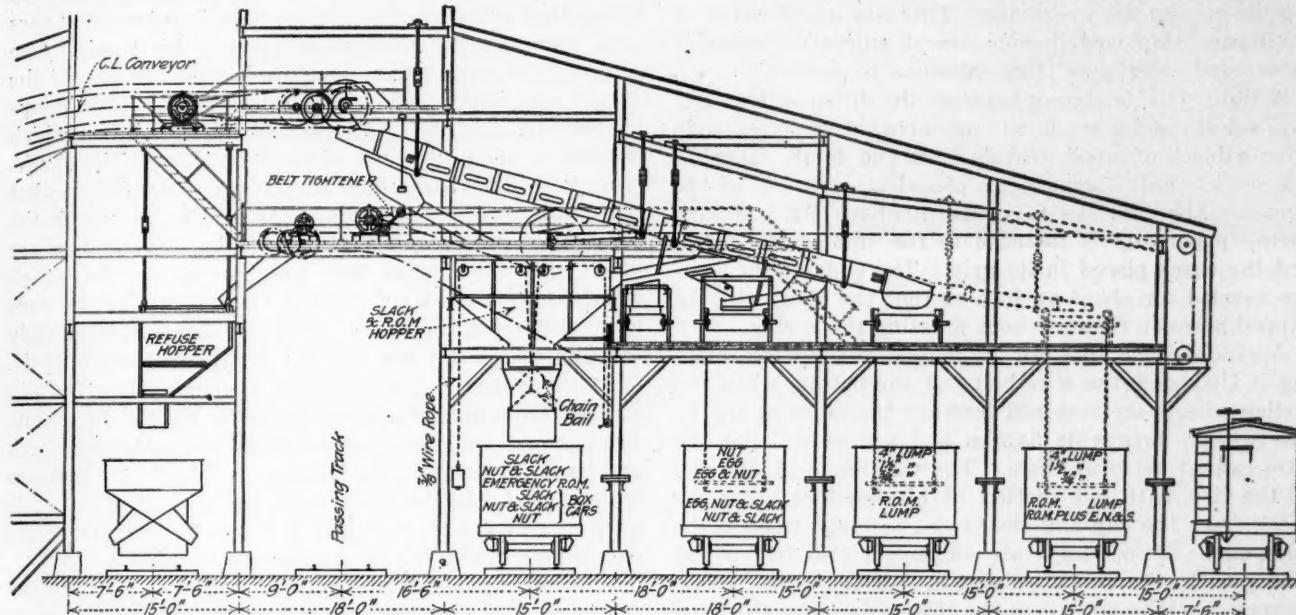


FIG. 8. HOW THE COAL IS DISCHARGED TO THE SHAKER SCREENS

above. Each boom has its individual hoist, which is worm geared and therefore self-locking. Each is driven through bevel friction wheels and a belt from a common countershaft, in turn driven from a 10-hp. motor by another belt reduction. The hoists are operated by hand lines. These are carried to the operator's cabin, which is located above the tracks in such a position that the operator can observe and control all the leading booms. All starting boxes for the picking table motors are likewise located in this cabin, which is plainly shown in Fig. 9.

A mixing conveyor of the chain and scraper type is located crosswise in front of the loading booms. This conveyor receives coal from the slack and nut conveyor previously mentioned, also, if desired, the egg and lump coal from the loading booms over tracks Nos. 2 and 3, and discharges into a small receiving hopper located over track No. 1, whence it may be loaded into open cars on track No. 1 or by means of a Manierre box-car loader deposited in box cars on track No. 0. It is therefore possible to load any combination of picked coal on tracks Nos. 1 and 0, either in open or box cars.

priming coat of "Highway Red" paint and a second coat of "Black Carbonizing Coating" protect all steelwork from corrosion, and special pains have been taken to facilitate future painting through the avoidance of all lattice work of any kind and all back-to-back angles

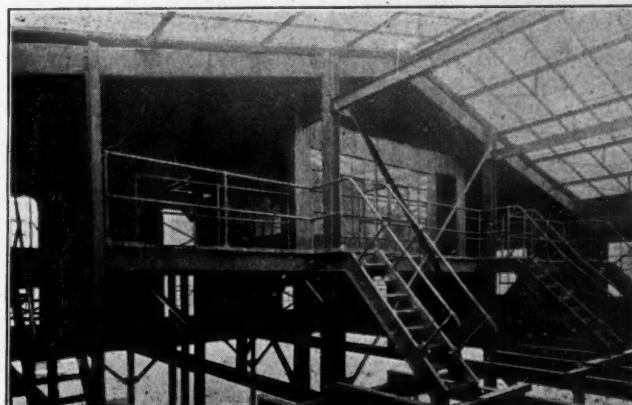


FIG. 9. OPERATOR'S CABIN, IN WHICH STARTING BOXES ARE LOCATED

with an open space between them. The structure is covered with painted galvanized corrugated steel sheeting. All windows are of the steel sash type with ribbed glass panes except the operator's cabin, which has plain glass panes. Skylights have ribbed wire glass, the ribs producing diffused light within the tipple. Special ventilators have been provided at all dusty places. All stairways exposed to the weather are equipped with "subway" steel treads, which are non-slipping in winter.

The Consolidation company has spared no effort to secure a thoroughly modern tipple of large capacity. Efficiency, simplicity and safety were the watchwords of the engineers. This structure was designed, fabricated and erected by the Fairmont Mining Machinery Co., of Fairmont, W. Va.

Handling Miner's Checks at the Tipple

BY RALPH W. MAYER
California, Penn.

The Harwick mine of the Equitable Coke Co., at Cheswick, Penn., has in use a simple yet safe method for conveying the miners' checks from the man dumping the cars to the weighman. This is a modification of the means employed in department stores for sending money and sales slips from salesman to cashier.

A tight wire is strung between the dump and weighman's desk, and a small carriage about 6 in. long, made from a block of wood, travels back and forth, carrying the check. Felt bumpers are placed at each end of the wire for the carriage to strike against. An ordinary spring paper clip is fastened to the side of the block, and the check placed in its grip. The ends of the jaws are beveled for about an inch so that the check may be slipped between them without pressing the spring.

A groove is cut through the middle of the block, making it U-shaped, the wire being at the bottom while the trolley wheels are fastened between the sides of the U. The wheels have wide flanges and are so set that the wire cannot get over them. The weighman at one end of the line with one motion of his hand removes the check from the clip and shoots the carriage back to the dumpman. Two dumps are employed, also two wires. One goes to the check weighman and the other to the company weighman, but as the checks are removed from the clip they are placed where both men can see them and get the check number. These two men sit at opposite sides of a desk which has the scale beam over its center.

At the Vesta No. 7 mine a sheet-iron pipe set at a stiff incline extends from the dumpman to the weigher. The end of the pipe nearest the dumpman is provided with a funnel into which the checks are thrown. They then follow the pipe to the weighman. The funneled end of the pipe is placed close to the dumpman, so that he does not have to move to put the checks into it.

At the Pittsburgh Coal Co.'s Crescent mine the weighhouse is close against the track, up which the cars are pulled by a chain haul. Two boys remove the check, which are placed on the outside of the cars, on the opposite side from the weighhouse, and throw them across the track into a large megaphone-shaped horn, or funnel. From this the checks fall onto the weigher's desk.

The cars may be dumped from any one of four or five dumps during a day, as the tipple loads onto river barges as well as into cars on four or five sidetracks. It is desired to know the weight of the coal dumped into each barge or car as weighed by the tipple weigh-

man. To accomplish this the miner is supposed to put two checks on each car he loads. The weigher gets one of the checks, while the second is left on the car for the dumpman.

Each dump at the end of the shift then has the checks for all the cars dumped over it during the shift. By taking the weight credited each car check from the weighman's sheet, the amount of coal dumped in each car or barge easily can be ascertained.

Some miners put only one check on their cars because of a shortage of checks, or for other reasons. In such a case one boy returns this check and gives it to the weighman, while the second boy writes the number on a slip of paper and places it on the car instead of the metal check. The dumpman keeps this slip as a tally of the check number of the car.

OTHER PRACTICES IN USE

At the Vesta No. 4 mine the weigher takes the weight hole in each check, in the order in which he dumps the files the car checks on a spindle passed through the cars, which is of course in the same order as that in which they come over the scales. As many as 2000 cars have been dumped in eight hours over this tipple. One scale and two dumps are employed, although one of the dumps can handle the cars if necessary. The dumps are side by side on the tipple, and the spindle on which the checks are filed is placed between them. The checks from both dumps are filed on the same spindle, so that the checks are in the same order as that in which the cars were weighed on the scales. As the spindles are filled with the checks they are carried to the weigh office, where a clerk coordinates the weights of the cars with the check numbers. This is done continuously throughout the day and not left for the end of the shift.

At the mines of the Canadian Collieries Co., Ltd., in British Columbia, the weigh office is beside the dump. The cars are weighed, and the dumpman takes the check and hands it through the window to the clerk. A beam scale is used, and the clerk leaves the weight on the scale until he gets the check, when he places the weight on the weighsheet under the corresponding number.

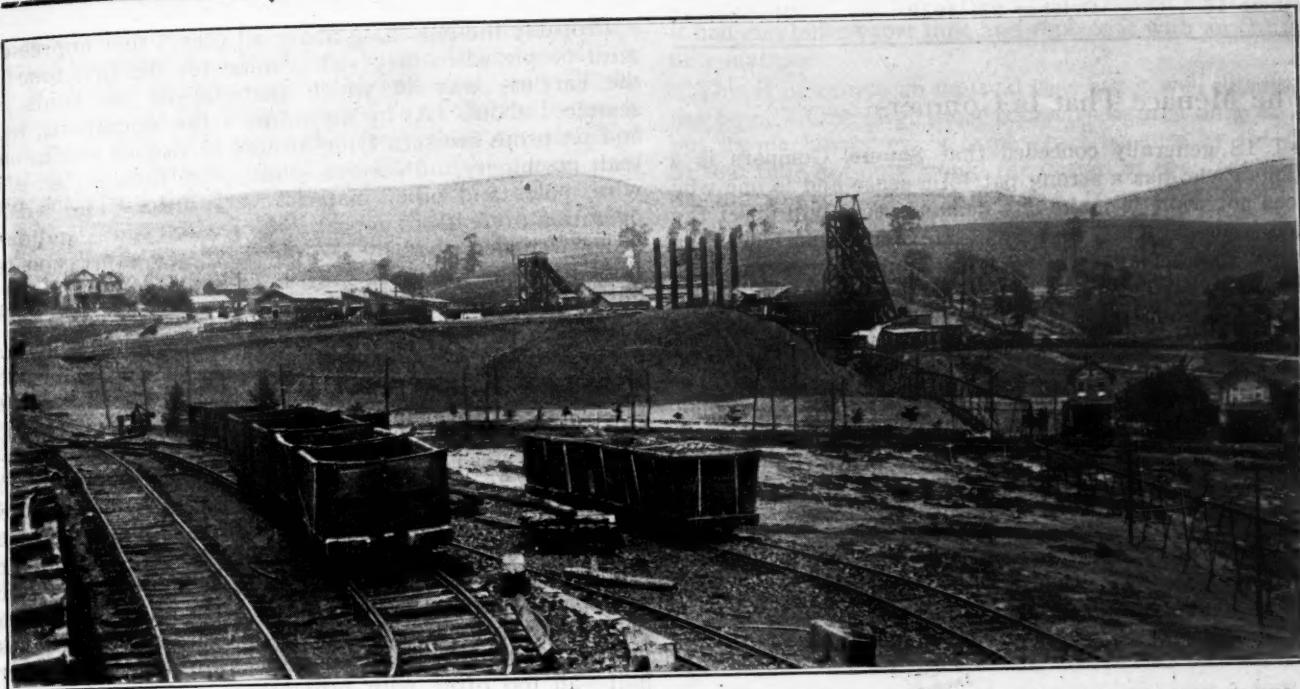
In the Northwestern Improvement Co.'s plants the checks are hung on the outside of the cars. The weigh office is beside the dump, and the dumpman removes the check and gives it to the weighman, who immediately places the car weight under the miner's check number on the weigh sheet. A dial scale is employed at most of the mines of this company, and the weight has to be read at once, before the car moves off the scale platform.

It is the custom throughout the Roslyn, Wash., coal field in which this company operates to place the car checks on the outside of the car. A loop of twine is passed through the hole in the check and fastened to the handle of the car door. Checks are seldom changed on the cars. One hundred dollars and costs, with expulsion from the miners' union, is what the punishment has been in the isolated cases that have occurred. This may be an effective deterrent, although the miners as a rule are honest and habitually ostracize any one who steals tools or powder from a fellow worker in any mine.

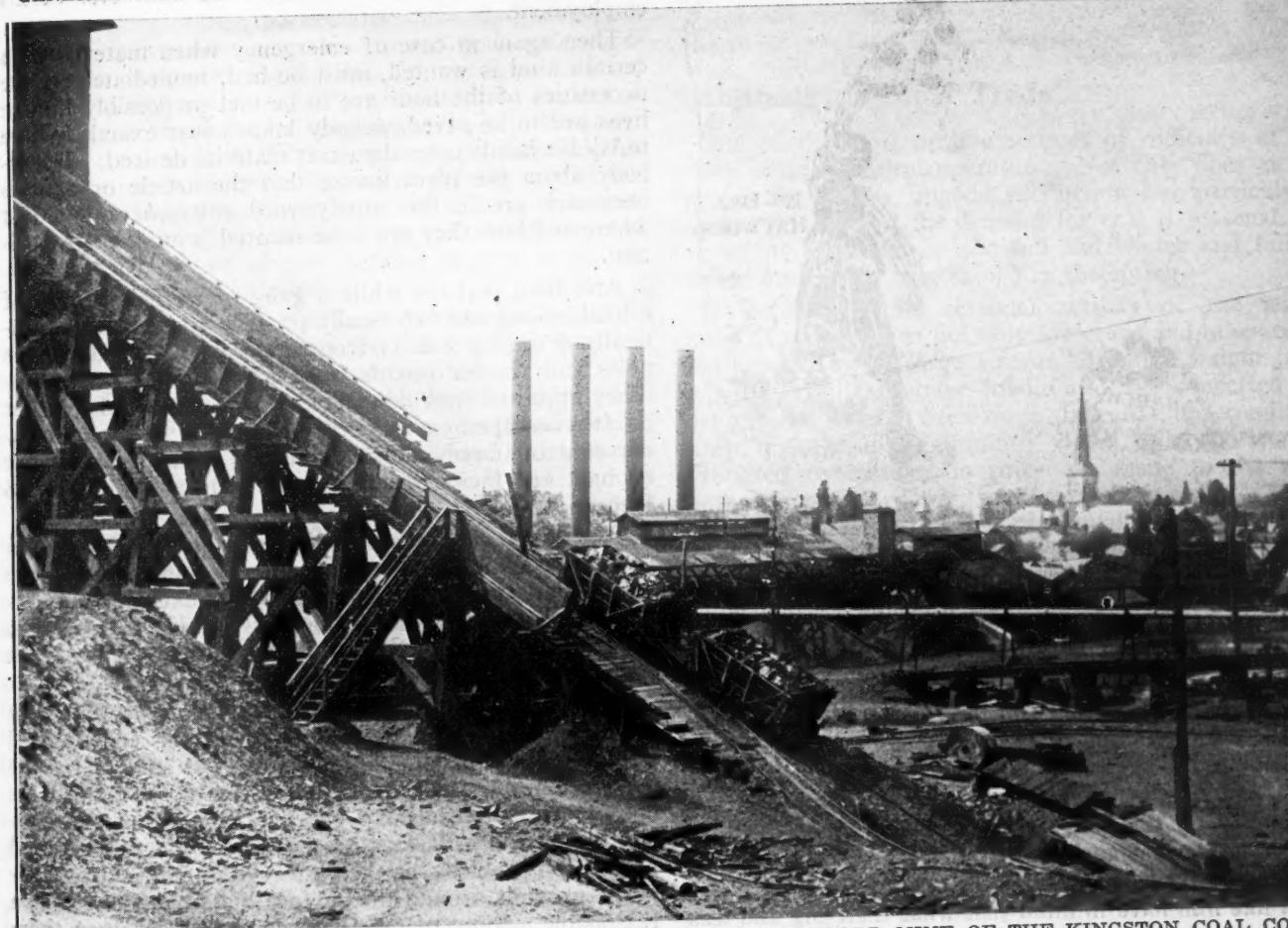
Extensive coal measures are reported to have been discovered close to Albertville, Lake Tanganyika, Belgian Congo, and are now being exploited.



SNAPSHOTS IN COAL MINING



GENERAL VIEW OF THE SURFACE PLANT OF THE GAYLORD MINE OF THE KINGSTON COAL CO., PLYMOUTH, PENN.



COAL FROM ONE OF THE SLOPE MINES GOING TO THE BREAKER, GAYLORD MINE OF THE KINGSTON CO., PLYMOUTH, PENN.

COAL AGE

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The Menace That Is Gompers

IT IS generally conceded that Samuel Gompers is a man who has a strong patriotic sense and is one who does not want to make any demands that will upset the industries of this country. His long experience has given him a conservative trend, and during the war there has hardly been a labor leader in whom the public in general has had more confidence. Unfortunately, it is in these characteristics that Mr. Gompers' power for evil lies.

The public does not fear so much what Gompers may do, as that the concessions, which he is managing to wring from the Administration, may prove the undoing of the social fabric. The strength of the unionism



which he is creating he may be intending to use with judgment and a keen sense of obligation. But the provisions for industrial democracy which he is establishing, the labor trusts which he is creating and the court defenses he is breaking down, may be used by such men as Bill Haywood and those of his ilk to paralyze the industries of the nation and to create that anarchy for which they have long been itching.

Gompers is like the small boy who is asked by his taller and longer fingered brother to climb the tree and shinny along the bough till his weight brings within reach the luscious apples that the latter has long desired. It is not likely that Mr. Gompers or other excellent men like him have in mind just what their big and less scrupulous brother, Bill Haywood, intends to do when

the limb is lowered. In this the analogy undoubtedly fails. The cartoonist who has in mind the facts and not their causes, has, however, well portrayed what is quite likely to happen.

Prevalent Disorder in the Material Yard

Probably the one thing above all others that impresses most people when they visit a mine for the first time is the careless way in which material of all kinds is scattered about. At no means a few operations, ties and pit props are seen lying around in riotous profusion, with machinery, of various kinds, pipe, fittings, lumber, wire, poles and other material very ditto. The whole operation presents an appearance of carelessness and disorder well described by the old woman's expression to the effect that "the devil must have had a dance and forgot to clean up afterward."

In these days when sanitation about the miners' homes is almost enforced, and when neatness in and about and around the dwelling-houses is encouraged by all possible means, a surface plant of the slattern type—with which every coal mining man is unfortunately familiar—is anything but a good example for the company employees to pattern after. The housewife who has a strong natural tendency toward neatness, also is quite liable to become disheartened and disgusted with life in general and the mining town in particular if from the window of her spic and span living room she can and often must overlook a plant that represents a distinctly opposite extreme. It is not strange that such a woman seeks to induce her better half—all too often with promptness and complete success—to change the place or even the character of his employment.

Then again in case of emergency when material of a certain kind is wanted, must be had, immediately if the necessities of the hour are to be met or possibly human lives are to be saved, nobody knows just exactly where to lay his hands upon the exact material desired. Everybody about the plant knows that the article or articles necessary are in the supply yard *somewhere* but just where and how they are to be secured is another proposition.

And then perhaps while a gang of men in charge of a loud-voiced and artistically profane foreman are frantically dragging 2 x 4s. from under a pile of telephone poles and brattice boards from a heap of pit props, another group of men down underground somewhere shut off from escape by a fire that could easily be brought under control if only the air could be brought along fast enough, are facing death as only miners know how to face it.

This is perhaps an extreme picture but one well within the range of possibility. Some superintendents, some exceptionally rare ones, go to the other extreme and imitate the example of the section boss on the railroad who kept four men hunting five days for a misplaced track spike!

Neatness can be carried to extremes of course, but such extremes are unfortunately seldom encountered around coal mine plants. As a man is known by the company he keeps, so does the average layman form his opinion of the officials of a plant by whether or not, neatness is apparent. He assumes that the engineering and production problems are being met in an efficient manner if the grounds around the surface buildings show that a reasonable amount of care has been bestowed upon them in the matter of the storage of materials.

Maps, Like Books, Should Be Sized.

Today we size everything—coal, loaves, books and catalogues. Many are already sizing maps and the work cannot progress too fast. The practice of making every drawing of a different size, so that, if it is filed in a drawer, it is lost and, if filed in a book, its edge lies within or without the rim of the map above it or below it, is wholly contrary to modern practice. Small maps should be placed in a loose-leaf binder, larger maps in a large shallow drawer, preferably of steel, and all the maps in any file or drawer should be of the same size.

A good plan is to make the demy sheet the standard and divide it into two and into four making two sizes semidemy and demisemidemy.

The tracings, larger than demy, if not the maps also, can be made of the same proportions as semidemy so that they can be photostated down to the semidemy size and then can be bound with semidemy blueprints.

Every mine operation, however small, should now be making its mine-map tracings with lettering suited in size to photostatic reduction, for though small concerns cannot have a photostat they can easily have their work done at a near-by studio and so have a record that will be large enough for most purposes, thereby preserving the condition of the larger tracings and making easy many calculations that on a larger map can only be made by using a long straight edge and certain acrobatic stunts common only to the drafting table and the swimming pool.

Varying Standards of Durability.

At some coal mines, particularly those that have been in operation over a considerable term of years, one sometimes sees an interesting combination of new and old equipment. At one plant in Nova Scotia may be seen a motor driven fan and a hoisting engine built in the latter sixties. At a mine in Wyoming a steam hoist almost equally as old is in use. An engine driving one of the breakers in the anthracite region is said to have been built in 1856 and although it has had a new cylinder or two and probably several sets of new packing rings it is still on the job and running as usual.

It goes without saying that any machine that can withstand everyday wear and tear for half or three quarters of a century must have been constructed of good material in the first place. It must also have received good care and attention. Without either or both no device such as a hoisting engine could be expected to last more than a few years at best.

It is in the matter of materials used in construction that certain foreign machine builders appear to excell those of our own land. Thus English engines are notoriously famous on account of their longevity. The same may be said of some machine tools and other devices. While there are exceptions to all rules there is no gainsaying the fact that as a class English machines are of heavier design and more highly finished than American devices built for the same purpose and of the same capacity.

Of this fact the Briton often boasts and believes that he is justified in so doing. In some instances he may be quite right but in others he may be dead wrong.

We in America like to think that we are highly progressive. Certain it is that during the lives of men now living we have forged ahead of other peoples in the use of machinery. Improvements in design have followed

each other with dizzying rapidity. For example a big central station in Chicago some years ago purchased a large steam turbine, direct connected to an electric generator. Before this machine had been in operation six months a new design had been perfected so much superior in steam economy that the one in operation was rendered economically obsolete. That is it would have paid the owners to tear out the turbine just installed even though it had run but a short time and replace it with an entirely new machine.

This is of course an unusual case but it well illustrates the point. One large steel company figures on wearing out its machinery every three years because by the end of that time not only would the design of each particular machine have improved but the requirements of the company would also have changed or most likely have increased.

Under such circumstances it is little wonder that American manufacturers have not built their machines to last indefinitely. The maker must furnish what he can sell and if the buyer wants a machine to last not more than ten years he would be foolish to build one that would last 50 or 100 years.

In certain types of machinery many American builders have produced products that for durability would compare favorably with any made anywhere in the world. The widely accepted theory that machinery of American manufacture is inferior so far as durability is concerned may or may not have a foundation in fact. Certain it is that many American machines are built for a definite and usually short life as measured in years. The retention of such machines or the attempt to operate them for much longer periods is in many instances a sign of unprogressiveness on the part of the owner.

Stabilizing the Coal Trade

One of the most prolific sources of difficulty at the mines is non-uniform operation. Not only does an irregular car supply impede production but particularly in the Middle West the demand for coal is seasonal, attaining its maximum in the fall and winter and falling off (in some cases to nothing) in the spring.

Unfortunately this seasonal activity of the mines comes at a time when not only are crops and other commodities moving in large volume but when freight traffic is hindered by winter conditions. No concerted effort appears to have been made to rectify this condition except in the case of anthracite. Here, as is well known, graduated concessions in price are made to the purchaser during the spring and summer months. These have unquestionably been instrumental in increasing demand for fuel at the time when production would otherwise be least.

It would seem that some such arrangement might well be made for bituminous coal. One plan that has been suggested is that freight rates be decreased in the early spring and gradually brought back to normal as the summer advances.

While this would doubtless be highly beneficial from the standpoint of the coal operators it can hardly be considered fair to the railroads. For although the steam carriers would reap the benefits accruing from a more uniform demand and consequently a more uniform distribution, they would nevertheless be saddled with the entire expense of the scheme while the mines would be cobeneficiaries.

Desirability of Standardizing Mine Rescue Training and a Plan Therefor*

BY D. J. PARKER†
Pittsburgh, Penn.

THE modern mine-rescue breathing device, the function of which is to permit the wearer to penetrate irrespirable gases formed by mine fires, mine explosions or similar causes. Several types of breathing apparatus are now made. One of these depends on liquid air for the breathing supply, a second depends upon the generation of oxygen from a chemical compound, a third upon normal air under pressure, and a fourth, which is most widely known in America, depends upon more oxygen under high pressure for its air supply.

The history of breathing apparatus dates from the year 1868, when a device was used similar to the submarine diver's helmet. Practically all succeeding forms were built along similar lines until 1896, when the present portable self-contained type was devised and used abroad. The first self-contained apparatus to be employed in the United States were four sets imported in 1907 by the Anaconda Copper Mining Co., of Butte, Mont. In September, 1908, breathing apparatus was purchased by the Technologic Branch of the U. S. Geological Survey, for use in mine rescue and recovery work, which at that time was in charge of that branch.

Today the Bureau of Mines has ten rescue cars, five rescue trucks and eight safety stations distributed throughout the mining regions of the United States, equipped with some 300 complete sets of such apparatus, while several thousand sets are owned by state mining departments and mining companies having rescue crews trained in their use.

Breathing apparatus may be divided into two types as regards the length of time the apparatus will furnish pure air on one charging; these are the half-hour type, principally used on vessels or where men are only exposed to dangerous atmospheres for short periods of time, and the two-hour type, which is the kind used in mines. In mine rescue and recovery work the apparatus wearer may have to travel considerable distances from his base, and two hours has been adopted as the maximum period of service compatible with lightness and convenience of portability. Only the two-hour type is considered in this paper.

In the United States there has been a steady growth in the use of breathing apparatus by the mining industry. As with many other new devices, when they first appeared mine operators and owners were at first decidedly skeptical as to the merits of the apparatus. However, owing to the progressive spirit of numerous operators, both coal and metal, the ingenuity of apparatus manufacturers, and persistent effort of the

Thousands of sets of breathing apparatus are in use throughout the United States. Examinations of men trained in the handling of this equipment are held regularly, yet no standard or uniform system of training in the use of this apparatus has been adopted. The establishment of a uniform course of training would be advantageous to all concerned.

Bureau of Mines, a more intelligent understanding of the use and limitations of such equipment has been attained.

As a result of the combined efforts of those appreciating the necessity for such a device for safely penetrating noxious atmospheres, a tremendous impetus has been given to its use in the mining industry, especially within the

last three or four years.

I believe that it will be agreed that breathing apparatus occupies an essential and permanent position in the mining industry. It does not seem necessary, therefore, to point out instances where lives have been saved directly by the use of such apparatus, or to give even approximately the figures showing the value of the vast amount of property saved to the nation annually.

Today there is not a mining district in the United States that cannot on short notice in time of disaster obtain the services of trained men equipped with apparatus either from state or privately owned rescue stations or from the Bureau of Mines. Also, most of the larger companies have rescue equipment and organized safety crews.

NECESSITY FOR STANDARDIZED COURSE OF TRAINING

On account of the constantly increasing demand for apparatus training, the Bureau of Mines has for some time appreciated the necessity for a standardized course of such training. Thorough and systematic training are essential to insure the safe and economic use of the apparatus. Such training can best be insured through standardization of training methods. As a result of a standardized course, it is believed that more attention will be paid to the selection of the proper type of men for rescue crews, efficiency will be increased, and higher appreciation of the value of the apparatus will result.

The reasons for standardization are, in fact, so obvious that it hardly seems necessary to dwell further on this phase of the subject. It might be mentioned, however, that there are two essential reasons, in addition to those already mentioned, for such standardization. These are:

1. It is the policy of the Bureau of Mines, upon request, to give a thorough examination to men trained either at privately or state-owned rescue stations, with a view of qualifying them for mine-rescue certificates as issued by the Federal Government. A standard course of training would most assuredly be highly advantageous to both the examiner and the examined.

2. Trained men going from one mine to another would be decidedly at a disadvantage when called upon to wear apparatus, assuming that the men at each mine

*Paper presented before the eighth annual safety congress of the National Safety Council, Cleveland, Ohio, Oct. 1 to 4, 1919.
†Mine safety engineer, U. S. Bureau of Mines Experimental Station, Pittsburgh, Penn.

had received a different course of instruction. This would hold true even though their training had been with the same type of apparatus. As an illustration, it has been known to occur that where one instructor would require the evacuation of the apparatus of all normal air, another would require the inflation of the breathing bag with exhaled air, while still another would permit the wearer to don the same type of apparatus containing normal air. Such diversity of instruction may result in serious difficulty for the wearer.

It is believed that a course similar to that pursued by the Bureau of Mines in the standardization of first-aid instruction should be followed in this case; that is, by the wide dissemination of a publication on the subject. I will now attempt, without going into details, to give a few of the fundamental principles that might form a basis for such a publication.

On account of the extremely hazardous work of wearing rescue apparatus in deadly atmosphere, too much attention can not be given to the selection of an apparatus and the training of the wearer. Many of us are inclined to think of a course in apparatus training as consisting of so many hours under oxygen in an irrespirable atmosphere. In reality, this phase of the course, though essential, is second in importance to a thorough and scientific knowledge of the use and the mechanical and physiological limitations of the apparatus. No one should be accepted for training without first receiving a thorough physical examination by a competent physician or surgeon.

DETAILS OF STANDARDIZED COURSE

The length of the course should not be less than five periods of four hours each. At least eight hours should be spent under oxygen and in an irrespirable atmosphere. Wherever possible the apparatus work should be given underground. The course should include standard lectures on each of the several types of apparatus now in use in this country. Such lectures should dwell at length on the various tests of the apparatus, in order that the wearer may know to a certainty that his equipment is functioning properly before entering a zone of poisonous gases. A person to be skilled in the use of breathing apparatus should not only have a thorough knowledge of the use and care of the equipment and oxygen pump, but he must also have a working knowledge of mine gases; that is, he should be familiar with their sources of occurrence, physical properties, effects on man, and methods of testing for their presence, particularly those gases encountered after mine fires and explosions.

Knowledge of at least two types of flame safety lamps is desirable on the part of the apparatus man trained for work in coal mines. This is not so essential in the training of metal miners. The standardized course should specify the purity and method of manufacture of oxygen to be used in the apparatus. Oxygen manufactured by the electrolytic process may contain a certain percentage of hydrogen. The Bureau of Mines has therefore tentatively specified to manufacturers who supply oxygen for use in mine-rescue apparatus that the oxygen shall not contain more than 2.5 per cent. of nitrogen nor more than 0.2 per cent. of hydrogen. Also the purity of the regenerating material should be specified.

In addition, the course should deal at some length with the method of procedure following mine fires and

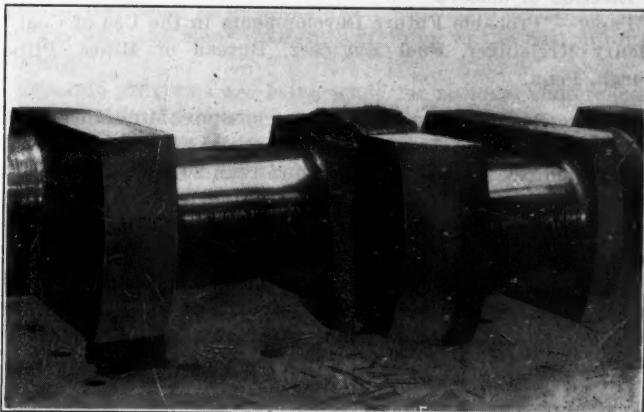
explosions, including the duties of the captain of the rescue squad.

Publication regarding such course of standardization is now contemplated by the Bureau of Mines. The necessity for such standardization is already, I believe, universally recognized among the manufacturers and users of breathing apparatus. By the wholehearted coöperation of apparatus manufacturers, safety engineers and the mining public such standardized training will be established and oxygen breathing apparatus made a safer and more efficient agent for the help of mine owner and miner in times of trouble and disaster.

An Unusual Welding Repair Job

BY J. O. SMITH
New York, N. Y.

An unusual welding job that required high engineering ability and skill to successfully handle was that executed upon a broken six-ton crankshaft that was fractured through the web of one of the cranks. This shaft was part of the equipment of a large refrigeration plant, but as repairs could not be made in its immediate vicinity, the broken shaft was shipped to the Jersey City, N. J., plant of the Vulcan Iron Works.



Here it was repaired by the Wilson Welding Repair Co., a plastic-arc welding outfit being used for the purpose.

The greatest difficulty in this repair lay in securing proper alignment of the shaft at the conclusion of the work. The shaft was clamped to a table and lined up, and the welding proceeded after the metal at the break had been chipped out so as to insure a clean surface for the added welding metal to fuse with.

The job as finished is shown in the accompanying illustration. When the welding was completed the shaft was tested in a large lathe and found to be entirely true from end to end.

Good Quality Coal in China

Coal is found in many districts in the Kwangtung Province of China and is mined by the natives in a small way. The many tests made show that the coal is of good quality for steaming or coking. The coal-mining industry requires only the investment of capital and favorable mining regulations to bring it up to a high stage of production. Up the North River there is an abundance of a very fragile semi-anthracite which is easily accessible. The analysis shows volatile matter 13 per cent., fixed carbon 75 per cent., ash 12 per cent. and heat value 12,000 B.t.u. per pound.

Program of Coal Mining Institute of America.

The 33rd annual meeting of the Coal Mining Institute of America will be held in Pittsburgh on Dec. 3 and 4. President E. N. Zern and Secretary H. D. Mason, Jr., have formulated an attractive program for the two-day session.

As a result of the active membership campaign inaugurated by Mr. Mason some time ago, nearly 1,000 members have been enrolled in the institute. The meetings will take place in the auditorium on the second floor of the Chamber of Commerce Building in Pittsburgh. Widespread interest has been manifested over the coming meeting throughout the different coal fields.

As has been the case in the past, one of the features of the proceedings will be the question box discussion. Already questions have been received from points as far distant as Alabama. Inasmuch as the questions are usually the liveliest portion of the program, the president has requested that all members come prepared to take part in the discussions. At the close of the first day a banquet will be held in the William Penn Hotel, at which time addresses will be delivered by men of national reputation. The completed program is as follows:

WEDNESDAY, DEC. 3, 9:30 A. M.

BUSINESS SESSION—E. N. Zern, presiding.

Reports of officers and committees.

Election of officers.

Paper—"Probable Future Developments in the Use of Coal," Henry Kreisinger, Fuel Engineer, Bureau of Mines, Pittsburgh, Penn.

QUESTION BOX SESSION—T. K. Adams, State Mine Inspector, presiding.

Question No. 1—In a room of more than 20 ft. width, should timbers be uniformly spaced between the track and the gob rib? Or should they be set more closely in the center of the room than in the gob?

Question No. 2—What is a fair water gage reading for a mine operating under favorable conditions and circulating 100,000 cu. ft. of air per minute? 200,000 cu. ft.? 300,000 cu. ft.?

WEDNESDAY, DEC. 3, 2 P. M.

Paper—"The Constitution of Coal as Seen With a Microscope," Dr. Reinhardt Thiessen, Research Chemist, Bureau of Mines, Pittsburgh, Penn.

Paper—"The Labor Factor in Coal Mining," Charles L. Fay, Director, Safety and Efficiency Department, Davis Coal and Coke Co., Cumberland, Md.

QUESTION BOX SESSION—Dr. E. S. Moore, Dean Penn State School of Mines, presiding.

Question No. 3—How should amusements and recreation for miners—white and colored—be conducted in isolated mining camps?

Question No. 4—Why do coal companies in Pennsylvania not employ more college-trained men on their staffs?

WEDNESDAY, DEC. 3, 6:30 P. M.

BANQUET—W. E. Fohl, Mining Engineer, Pittsburgh, Penn.

Toastmaster.

Speakers—R. Dawson Hall, Managing Editor of "Coal Age," New York City; Dr. G. H. Ashley, State Geologist, Harrisburg; Dr. A. A. Hamerschlag, President, Carnegie Institute of Technology, Pittsburgh; Dr. John A. Brashear, foremost citizen of Pennsylvania, Pittsburgh.

THURSDAY, DEC. 4, 9:30 A. M.

QUESTION BOX SESSION—P. J. Walsh, State Mine Inspector, presiding.

Question No. 5—Has the steel mine car made good?

Paper—"Modern Practices in Coal Washing," Prof. H. C. Ray, School of Mines, University of Pittsburgh, Pittsburgh.

QUESTION BOX SESSION

Question No. 6—Under like conditions, which is superior for attaining a large output—a drift or a shaft mine?

Question No. 7—Can the electric bonding of rails be recommended as an effective and economical method?

THURSDAY, DEC. 4, 2 P. M.

QUESTION BOX SESSION—Richard Maize, State Mine Inspector, presiding.

Question No. 8—Is alternating current more satisfactory than direct current for the operation of coal-cutting machinery?

Paper—"Pillar Drawing," A. W. Hesse, Chief Mining Engineer, Buckeye Coal Co., Nemacolin, Penn.

QUESTION BOX SESSION

Question No. 9—How much coal should a coal-loading machine, employing three men in its operation, produce daily to warrant its use? Should a guarantee of performance be exacted before purchase?

Question No. 10—What are the advantages and disadvantages of the "advance and retreat" method of drawing pillars?

Coal in Spitzbergen

The Scottish Spitzbergen Syndicate (Ltd.) advises the press that news of an important discovery of coal has been received from the leader of the syndicate's expedition which left Leith for Spitzbergen on July 15. A party was landed north of Prince Charles Foreland to continue the work of exploration started by the syndicate before the war, the steamer with the other members of the expedition anchoring at Klaas Bilten Bay, where they joined the advance party that had reached there a month earlier. The work done by the advance party has been confirmed by the geological specialists with the main expedition. It is estimated that the quantity of coal already practically proved, over an area of only one square mile of this district, is 5,000,000 tons. Working facilities are reported to be excellent; there is deep water close inshore, and the seams can be attacked conveniently at a point near the beach. As an item of interest it is mentioned that even the weathered outcrop coal burns well, and is being used by some of the miners in preference to their oil stoves.

In Bosnia and Herzegovina there are produced about 2,800,000 tons of brown coal and 130,000 tons of high-grade coal. There are many deposits which are still untouched.

New Coal Deposits in Chile

An article published recently in the Chilean newspaper, "Las Ultimas Noticias," gives particulars of several new coal deposits which have been found in southern Chile. The first of these is stated to be near La Union. The quality of the coal is considered to be very good and machinery is being installed for the exploitation of the deposit. It is estimated that 40,000,000 tons can be extracted, and a special railway is being built to Rapallo station.

Another coal deposit has been found in the Department of Castro. The analysis of coal taken from the outcrop showed a residue of 9 to 10 per cent. of ash. The greater part of the coal field is on the beach, in the northern part of Castro Bay, and opposite the town of the same name. There are nine deposits in all. The coal from this region is different from that which comes from other parts of Chile, and is not unlike bog-head or cannel coal. The coal mines on the island of Lemuy (Chiloe) are, the paper adds, being exploited with excellent results, and within a short time exploitation on a large scale will begin.

According to "El Mercurio," coal has been found at a place called Mailef, 6 miles from the Central Railway Station of Valdivia. Its exploitation has been started, but little has been achieved so far because of bad roads and poor means of transport.

New Developments at the School of Mines of Carnegie Institute of Technology.

One of the features of the new co-operative department of Mining Engineering of the Carnegie Institute of Technology at Pittsburgh, Penn., has recently been announced by Captain Edward Steidle, secretary of the department. It will be a four weeks intensive course of instruction in coal mining and has been devised primarily for miners who aspire to hold certified positions. The course will consist of a general study and review of the all-pertinent subjects of mining law, ventilation, mine-gases, methods of mining, mine-rescue and first aid, safety, mine management and compensation insurance.

The course will be inaugurated on or about July 1 next. Upon completion of the studies, the State Department of Mines will hold examinations for fire bosses and mine foremen. This is the first course of study offered by a technical school in the Pittsburgh district that has been planned especially for practical mining men. The Chief of the State Department of Mines, Seward E. Button, has pledged his support to the proposed plan. A member of Mr. Button's inspection force, John I. Pratt, will be a member of the advisory board and will represent Mr. Button on all matters pertaining to the State Department of Mines.

Research work through the awarding of fellowships, will be carried on by Captain Steidle's department in conjunction with the Bureau of Mines. Graduates of approved technical institutions are eligible for fellowships in which work will be devoted to the various problems of coal mining and the utilization of fuel. Upon completion of the investigations, advanced degrees in engineering will be granted. Included in the investigation work will be the submitting of a thesis that may be published by the Bureau of Mines.

SOME OF THE FACULTY ADDITIONS

Among the additions to the faculty are the following: R. Z. Virgin, formerly director of mine extension work of the University of West Virginia. Mr. Virgin has had 35 years' experience in the coal mining industry and has advanced by successive steps from miner to superintendent. W. Z. Price has been engaged for "part time" instruction. Mr. Price is a Lehigh University man and was formerly division engineer for the Berwind White Coal Mining Co. Edward N. Zern, who needs no introduction, will round out one of the best balanced faculties found in any mining school. It will be remembered that Mr. Zern is President of the Coal Mining Institute of America and editor of the Coal Mining Catalogue and Coal Field Directory. He was formerly professor of coal mining at the University of West Virginia and the University of Pittsburgh.

It is planned to limit all of the classes to such size that a close relationship may exist between faculty and students. The present school year finds an enrollment of 44 freshmen in the four-year course and 24 sophomores. In the first year class of the two-year course, there are 23 men enrolled, of which 6 hold state certificates of competency. The type of students desired at Carnegie Tech are those who are sons of mine workers and officials, or boys who have actually been raised in mining communities. At least 80 per cent. of the present enrollment is composed of men who have had practical experience in coal mines.

Under a co-operative agreement with the Bureau of Mines, the new Pittsburgh Experiment Station will be thrown open to the students. Full advantage will be taken of the bureau library, equipment, advice of the technical staff, and the use of the experimental mine near Bruceton, Penn., for demonstration work. The Carnegie Institute of Technology adjoins the bureau buildings in Schenley Park, which gives a location that can be paralleled by no other similar school.

American Mining Congress to Hold Annual Meeting.

The National Exposition of Mines and Mining, embracing exhibits of mining machinery, safety devices and labor-saving appliances from practically every State in the Union, will be held in St. Louis, Mo., on Nov. 17-21, in connection with the annual meeting of the American Mining Congress.

It is planned to install the exhibits in what was formerly the old Southern Hotel, immediately after the close of the St. Louis Exposition of Industrial Arts and Crafts which is being held from Oct. 15 to Nov. 11. John T. Burns, of Washington, D. C., assistant secretary of the American Mining Congress, is at present in St. Louis assisting the local committees in making arrangements for the exposition exhibit and congress meeting. It is Mr. Brown's opinion that the exposition will see the largest exhibit from a purely mining standpoint, that has ever been held in the United States.

An unusually attractive program has been arranged for the Mining Congress. This will include open discussion of labor's plan to nationalize industry and the effect of labor control of railroads and mines, upon all national activities. The relation of mining to industrial prosperity and the close connection between the present low output per man and the extraordinarily high cost of all commodities will be discussed. Opportunity will be given through special conferences to those directly interested in bringing about legislative action in connection with the many matters pertaining to the coal mining industry.

Separate programs are being made for national conferences between mining men, state geologists and economists.

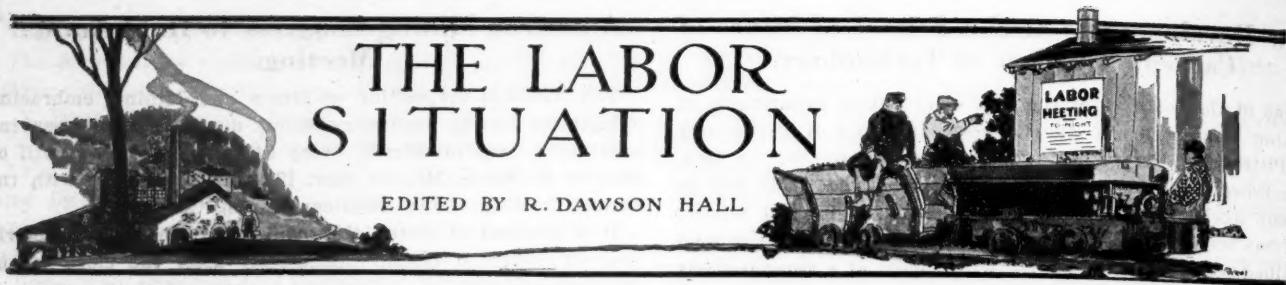
An attempt will be made in the coal mining section to formulate plans for the standardization of all mining equipment, a feat which, if accomplished, should prove of mutual advantage to both manufacturers and operators.

Some Interesting Extracts

Tax exists in the furnace in the form of vapor, an ideal condition for cracking. The small globules present a large surface for absorption of heat from the gases and hot furnace walls, and are quickly heated to a high temperature, which favors the formation of carbon.—*Bureau of Mines Bulletin No. 135*.

When methane is burned with insufficient air supply it burns with a yellow flame and deposits soot. Therefore, natural gas, which consists mostly of methane, should be burned with some excess of air and with provision for obtaining a good burning mixture; otherwise soot will be deposited and gas will be wasted, owing to incomplete combustion. In this respect natural gas differs greatly from producer gas, the latter consisting mostly of carbon monoxide, which does not readily decompose.—*Bureau of Mines Bulletin No. 135*.

The two conditions for smokeless combustion with mechanical stokers could be perhaps applied to gas producers to eliminate soot and tar from the producer gas; that is, to distill the volatile matter at low temperatures and in strongly oxidizing atmospheres so that the hydrocarbons burn to the products of complete combustion, CO_2 and H_2O ; then by passing these products through a bed of hot coke to decompose them into CO and H_2 . This process of gasification is similar to that which takes place in the under-feed type of mechanical stoker.—*Bureau of Mines Bulletin No. 135*.



General Labor Review

Not so important is what happens as what the people think of what happens. The attitude of a people, its soul, is as determinative as are the physical conditions. Physically it is questionable whether Russia is not a better country than the United States, but actually we know the vast difference between them. The reaction of the Russian to his physical conditions is such that he cannot hope to wrest from those conditions a living equal to that which the American enjoys as the result of his more logical reactions.

We do not need to worry therefore about what the week has not brought forth as between coal labor and coal capital, nor to concern ourselves much with the ineptitude of the head of the Department of Labor or how he has weakened himself by his alleged dabbling in union politics.

What we need to know is what the great public thinks, for the mine worker is doomed to disappointment if the public—the butcher, the baker and the candlestick maker—cease to hold in approbation the efforts the mine worker is making to raise his wages unduly. Significant, therefore, is the attitude of Congress the members of which have to be elected by workingmen.

Senator Myers, of Montana, on October 14 denounced Congressional investigations of industrial trouble because they operated to encourage strikes. "The only result of these investigations seems to be to encourage strikers and agitators in their violation of the laws," he asserted. Senator Poinexter wanted to know why foreign anarchists and advocates of sedition had not been extradited, while Senator Thomas, of Colorado, asked why men wearing soldiers' uniforms were engaged in the business of preventing men from going to work and in making demonstrations in favor of strikes.

After all is it not strange that men who wish to go to work are prevented from doing so by thugs in the United States uniform? No country is free where the right to work is shut off arbitrarily by a certain body of citizens, or worse yet, noncitizens, who take the law in their own hands and interfere with a man's right to labor for his living.

No Outcome in Negotiations with Miners

On October 17 the conference, foreshadowed in last week's issue, between William B. Wilson, Secretary of Labor; John L. Lewis, acting president of the United Mine Workers, and Thomas T. Brewster, who represents the coal operators of the Central Competitive Region, took place in Washington, D. C., and did not appreciably improve the situation. At the conclusion of the conference it was decided that the mine workers' acting chief should call his scale committee of 32 members to meet the 30 members of the operators' committee.

Mr. Brewster said the operators were willing to debate the issue (1) if the mine workers would recognize the contract had signed as still being binding, (2) if they would rescind the strike order and continue work pending negotiations and (3) if they would further concede that there would be no reduction in hours. A meeting was called, however, for Tuesday, October 21.

On the same day Mr. Lewis issued a statement asserting that the operators were profiteering and were charging in many cases \$1 more per ton as a result of the threatened strike. The operators in making their reply to Mr. Wilson's request for a further conference made the following statement explaining the attitude of the coal operators to collective bargaining:

"The operators deem it advisable to say that the coal operators of the Central Competitive Field have adhered to the principles and practices of collective bargaining for 35 years with the largest body of organized labor in the United States, and it is their opinion that the scale negotiations have broken down and that the contract has been abrogated by the miners' union in their call for a strike on Nov. 1, because the present system of collective bargaining does not fix equal responsibility under the law upon the employer and the labor union."

"Our experience teaches us that no set of employers should agree to a system of collective bargaining which does not make both parties to the contracts equally liable and responsible for the observance of the terms of such contract."

Mr. Brewster also sent to each member of the Senate and House a copy of the letter written to Secretary Wilson, in which Mr. Brewster concluded:

"To prevent any misconstruction of our reply, we desire to say that during the 33 years that we have been bargaining collectively with our employees, the miners' union has never carried out the terms of the various contracts as a business man is required to carry out his contract with others under the laws of the United States. This failure to carry out contract obligations is due in part to the inability of the miners' officials to control the members of their organization in the absence of legal responsibility."

When Oct. 21 rolled around, the operators were present at the assembly hall of the Red Cross Building to meet the mine workers, but four hours of conference did nothing to bring them closer together. The operators had no intention of making any concession on the three points which they had presented in the meeting of Oct. 17 and which they regarded as no fit matter for argument. The mine workers' leaders did not give way because they were not given the right by the Cleveland convention to make any concessions. The union leaders were merely devil's advocates to present, argue, and if possible, secure the whole or more of the ridiculous contract.

P. H. Penna, of Indiana, presented the operators' argument, and James L. Lewis that of the mine workers. Secretary Wilson suggested quite casually that the conference be reopened on the next day, to which both sides readily assented.

The folly of the conference lay in the assumption by Mr. Wilson that the operators, rather than the public, were battling with the mine workers and that he, Mr. Wilson, was trying to get them, the operators and the mine workers, together. The fact is that the operators, while not appointed representatives of the general public, are the only representatives the public has in a conference with the mine workers, and a representative of the public, such as Mr. Wilson is, should not be neutral, but support the public in the person of the operators, except insofar as he may believe in the rights of the mine workers to a partial settlement of their claims.

The administration violates its oath to serve the public when it is neutral about a matter of such paramount importance to the interests of its client. No one has yet seemed to visualize the fact that wage increases are injurious to the prosperity of the citizens of the State because they, and they alone, must ultimately pay them. Advances may be essential to the health and well being of the workers receiving them, or may be necessary to meet living costs. In such cases they are justified. If not, they are impositions on the other citizens of the republic and to be condemned as subversive of the public weal.

On the same day the Senate discussed the matter—occasionally, as is usual, with more heat than judgment. True, it took the right side in the controversy—the side of the public—but it misrepresented the facts, for despite what Senators may say, the large demands of the mine workers' leaders do reflect accurately the opinions and demands of the local representatives and probably those of the members of the union, as a whole, though a referendum would reflect the sentiment more completely.

It might be fair to question whether the union and non-union mine workers as a body want to so profiteer on the public, but the Senators reason without their host if they think the mine leaders are the source of the unreason. The local representatives at the convention did not so believe, as was shown by the fact that they removed all right on the part of their advocates to concede a jot of any one of the numerous demands. They required that all or none should be granted.

However, there was exhibited a desire in the Senate that the collective bargaining should be collective and not mere union bargaining, and Senator Knox, of Pennsylvania, suggested the enactment of a law declaring it to be illegal to institute any strike that affected commodities moving through interstate commerce, unless all the men, union and non-union alike, involved in the proposed strike have voted on it.

Senator Pomerene, of Ohio, wanted the Federal Government to take control of the situation, and Senator Warren suggested that the exemptions granted to organized labor in the operation of the anti-trust laws, be removed.

In the meeting of Oct. 22 Secretary Wilson made a proposal: "That wages be increased at the expiration of the present contract in an amount equal to the difference between the increases in wages received by the mine workers since July, 1914, and the increase in the cost of living since that date, that the increase be effective from the termination of the present agreement until Mar. 31, 1920, that, on these conditions, the strike order be withdrawn and the miners continue at work on these terms, that negotiations be entered into at the usual time for making the new scale effective after March 31, 1920."

John L. Lewis wanted to know when the present contract should be held to expire; whereupon Mr. Wilson said it was a matter of negotiation. Much ill blood arose from a reference made to the speech in the Senate on the previous day in which Senator Frelinghuysen said Mr. Wilson had told the Interstate Commerce Committee that the mine workers' demands were "impossible."

Mr. Wilson said that he had stated that the positions of both mine workers and operators were of that character. Mr. Lewis sharply attacked Senator Frelinghuysen "for deliberate misrepresentation of the facts" and declared that "the mine workers did not want to continue the conference if they were before a packed jury."

Today the leaders of the mine workers' unions voted to reject the proposals of the Secretary of Labor. The delegates met in the American Federation of Labor's headquarters, and John Lewis declared after the meeting that "the offer is inadequate, insufficient and fails to meet the necessities of the situation."

Reversing a Fan

If the violence of an explosion in a mine has not destroyed the ventilating fan or appliances, they should be kept in operation. The matter of the advisability of reversing the ventilating current is of great importance and requires a knowledge of the conditions within the mine and of the course of the ventilating currents prior to the explosion. The ventilating current should not be reversed without good reason, and the desirability of reversing the current depends entirely on local conditions, the plan of ventilation and the direction of the current on the main haulage roads and manways. Most of the men alive within a mine after an explosion attempt to escape by their usual road of travel, irrespective of the intake or return currents of air. However, if an underground official or superintendent is within the mine at the time of the explosion he may assemble the men and divert them to a road or manway that he knows is normally on the intake air current. Prompt reversal of the ventilating current has doubtless saved the lives of many men, generally, however, in mines where the fan prior to and at the time of the explosion was forcing the air, and the main haulage roads and manways were on the return current. Reversal of the ventilating current furnished fresh air to the traveling way, making possible the escape of the men. On the other hand, reversing the current has sometimes resulted in an explosion owing to the explosive gases liberated by the mine or by a fire being moved back over a fire.—*Rescue and Recovery Operations in Mines*.

In an organization effected for the purpose of rescue work in a mine after a disaster supply foremen, brattice foremen and shift bosses are necessary. The supply foremen should be given a sufficient number of workmen to enable them to furnish the brattice men enough material for constructing brattices and stoppings, so that no time may be lost in waiting. The brattice foremen should devote their time to directing the construction of brattices and stoppings for the establishment of ventilation.—*Rescue and Recovery Operations in Mines*.

Stretchers will be needed for removing the injured and the dead in a mine after a disaster. Carpenters should be set to work constructing stretchers, which may be made of brattice cloth or canvas nailed to boards 7 ft. 6 in. long by 4 in. wide by 1 in. thick. Each stretcher should be not less than 22 in. wide. The handles should be cut to 2½ in. wide with smooth edges. For carrying the injured, the stretcher should have spacers at each end of the canvas to hold the sides apart.—*Rescue and Recovery Operations in Mines*.

No feature of the work connected with the exploration of a mine after a disaster is more important than the rescue of persons who may still be alive. This work calls for mature and deliberate judgment on the part of the person in charge. Men who have had experience in exploring exploded mines and men who have been trained in recovery operations and in the use of rescue breathing apparatus should be asked to confer on plans and method of procedure.—*Rescue and Recovery Operations in Mines*.



DISCUSSION by READERS

EDITED BY JAMES T. BEARD

Safety in Shotfiring

Letter No. 2—The article describing the Gentry shotfiring device, COAL AGE, Sept. 18, p. 489, will doubtless interest all mining men who have had experience in the handling of explosives and shooting coal. Judging from the account given, it would seem that the device would certainly be a boon to men engaged in driving rock tunnels, sinking shafts, or performing other work where more than one blast must be fired at the same time. It should also fill a long-felt want in the mining of coal, and increase the safety of shotfiring in mines.

This recalls to my mind a letter that appeared some time ago in COAL AGE, drawing attention to the more improved methods in shotfiring (Vol. 15, p. 416). I wonder that this subject has not been further discussed by readers, as it is worthy of careful attention. Many devices have been invented with a view to increasing the safety of shotfiring in mines, but as yet we have been unable to stave off the fatalities growing out of this branch of the work.

Allow me, in this connection to cite a sad accident that happened in the use of a small electric battery for firing shots. About three years ago, one of the large companies operating in this locality adopted the plan of every miner firing his own shots by the use of a small portable battery. The plan gained favor rapidly with the men up to the time of the accident, which caused the death of two of the workers.

It happened in this instance that two miners and their laborers were engaged in driving a pair of headings, a gangway and an airway. As their working places were close together, the miners agreed to use the same battery, which they left at a convenient point on the gangway, a safe distance back from the face. In order to expedite the work of firing the shots when prepared, the men used separate wires, a gangway wire and an airway wire, the latter being carried through a crosscut near where the battery was located and thence to the face of the airway.

The day of the accident both miners had prepared their shots and the gangway miner and his laborer went back to the battery, intending to fire the gangway shots, while the airway miner and his laborer waited at the face of the airway, instead of going back to the battery. Perhaps, the latter were gathering up their tools, after coupling up their wires to the primer, in readiness for firing their own shots. By a grievous mistake, however, the gangway miner very carelessly connected the airway wires with the battery and both of these men waiting at the face were killed instantly.

This accident would have been avoided had the men used the precaution of not coupling up the wires to the primer at the face until after the other shots had been fired; or, better still, if they had gone back to the battery at the same time with the gangway men. But miners are prone to take chances and frequently lose out as in this instance.

Following the accident that I have just narrated, the company went back to the old method of firing with squibs and fuse. Speaking of shotfiring devices, it is clear that these must be thoroughly understood by the persons using them.

The device must be simple in construction, foolproof and have a good lock fastening, so that no one can use it except the competent person who has it in charge and holds the key.

Shotfiring at the best is a hazardous operation requiring care and the use of every precaution to avoid accident. In my opinion, all shots should be fired between shifts or by a competent shotfirer. Under no circumstances should a shot be fired in a place worked with safety lamps, except when special permission is given by the fireboss or mine foreman. Notwithstanding this, to watch some miners handling explosives, it would seem that they were engaged in playing some harmless game.

Practical demonstrations and moving pictures designed to show the danger of the careless use of explosives go far, I think, to impress on the miners the risks they assume. But, in addition to this, there should be enacted more strict laws regarding the handling and transporting of explosives in and around mines. Any miner who is permitted to use an electrical device for firing shots should take it with him to the face of his place where he can look after it until he is ready to fire.

A firing battery should be the last thing to be connected, and this should be done only after sufficient warning has been given everyone in danger. Before firing, all wires should be carefully examined to see that there are no short-circuits or breaks in them. It is a good practice to keep the wires on a spool instead of allowing them to lie along the rib where they are liable to injury. It is important, also, to keep an electric-firing device in a dry place, as dampness lowers the voltage and may cause a misfire.

West Pittston, Penn.

RICHARD BOWEN.

Bolshevism in America

Letter No. 7—I have been reading with much interest the letters on Bolshevism which have been appearing in *Coal Age*. It is a pleasure to note that the interest aroused on this subject has been spreading. It does seem entirely unfair for the Government to be so slow to take action in deporting undesirable citizens, on the fact of what real Americans suffered and endured during the recent war.

To the the situation seems to be one that has not so much to do with the causes and results of Bolshevism as that prompt action should be taken in ridding the country of those so inclined. I think John L. Lewis, acting president of the United Mine Workers of America, has opened a new field for the arbitration of labor's problems and at the same time closed the doors to anyone with a Bolshevik inclination, when he stated in calling off the strike that no matter what the justice of their cause seemed to them, they could not go against the statutes of their country.

As far as the high price of commodities is concerned, it is unreasonable to not expect some reaction to follow a war of the size of the one recently concluded. As long as wages keep pace with the high cost of living there should be no complaint. One is rather prone to forget the increase in wages and look at only one side, which is a human characteristic but entirely a selfish one. Much of the present unrest is due not so much to Bolshevism as it is to the inability of one to see the most in his own eye, a situation that furnishes a fertile field wherein the real seeds of Bolshevism may flourish.

Boswell, Penn.

MACHINE MAN.

Lawful Examination of a Mine

Letter No. 6—Referring to the letters that have appeared recently in *Coal Age*, outlining the work of a fireboss and explaining what is required to make a lawful examination of a mine, allow me to state briefly my way of looking at the matter.

In the first place, the fireboss must be able to detect any gas present in the mine air, by observing its effect on the flame of his safety lamp. He should be a certified man that has stood a successful examination before the examining board and gotten his papers. In my opinion he should have had at least three years' experience in gaseous mines, possess a practical working knowledge of the ventilation of mines and be fully acquainted with all ventilating machinery and the means used to conduct the air throughout the mine and distribute it so as to meet the requirements in each section.

I fully agree with the suggestion that the fireboss should enter the mine not more than three hours ahead of the shift, either day or night. He should place a danger board or, better, a red light at the entrance when he goes into the mine, as a warning for no one to enter until he has completed his examination and removed the danger signal.

In the examination of the working places in a mine, it is a good practice, in my opinion, to have a board nailed to a prop near the face of each place, similar to that shown in the accompanying figure. The fireboss should then mark on the board in each room the date and hour he examined the place. He should also mark the date with chalk on the roof close to the face, as evidence that he has been up to the very face.

After completing his rounds and returning to the shaft bottom, or mine entrance, the fireboss should make out his report, in a book kept for that purpose, and state what dangers he may have found in the places examined. He should then remove the danger signal at the entrance and check the men in as they go to work, taking care to hold the checks of these men whose places he has found not safe for work.

Let me say, here, that no examination of a mine is lawful or complete, unless the fireboss has made a thorough inspection of all roads, airways and passageways in his section and knows that the air-courses are not blocked and that all doors are closed and the air traveling properly throughout the entire section. Wherever a place is found to be unsafe for work, it should be fenced off so as to warn men not to enter. Notes should be made, also, where dust has accumulated on the road or in the working places.

In this connection, let me refer to the work of shotfirers and say that where such are employed they should always carry only a safety lamp and test every place for gas, besides charging, tamping and firing each hole. No shots should be fired in a place before making the test for gas to see that it is safe.

Roda, Va.

A. T. WADE.

Markers on Mine Trips

Letter No. 5—Referring to the inquiry of J. J. S., *Coal Age*, Aug. 28, p. 397, permit me to offer the following comments:

As a first consideration, the conditions described by J. J. S. are dangerous and should not be tolerated. I am of the opinion that the remedy of these conditions is of more importance than finding a good trip marker.

To insure safety the following conditions should be eliminated: 1. The steam locomotive should not be used underground. 2. Men should not be allowed to travel the main haulage road.

However, if the conditions mentioned must remain, I would suggest that shelter holes be made not over 30 or 40 ft. apart,

the same to be whitewashed all around. There should also be good ventilation provided, making this haulage road a separate split of air returning into the main return, so as not to allow this air to circulate in the workings or any other headings that men may have occasion to enter.

If electric current is available an electric light should be installed at each approach to a curve in the road, and the entire curve whitewashed. There should also be provided shelter holes at each approach. In addition to this there should be plenty of clearance on the curve and the same clearance should be maintained the entire distance on roads that men are required to travel.

If the cars, as J. J. S. says, make more noise than a dozen ordinary gongs, I should think his problem is already solved without the additional warning devices. As for using lights as markers I have never found a carbide lamp that was reliable to hang on a car, and I have tried some very good makes. As far as lights are concerned, the oil lamp is superior to any carbide light for that purpose, especially if the trip attains any speed. But I would think that a good strong carbide light could be used on the locomotive to advantage, as there would then be a case to protect it from a strong air current caused by the speed of the trip.

We have had part of this trouble ourselves and have used for a marker, on a trip descending a 13 per cent. grade, an oil lamp, which proved more reliable than several makes of carbide lamps previously tried. We have also used gongs that were actuated by the vibration of the trip, but found that on a fast moving trip they hardly gave any warning in time to allow men to reach a place of safety, unless good clearance is provided at the side of the road.

However, I am of the opinion that the safest means for J. J. S. to adopt would be a manway that would avoid the necessity for men to travel this heading. But where men must travel the haulage road it is important to provide plenty of clearance so that at no time will they be required to walk on the track.

In Pennsylvania the mining law requires that, on all animal and mechanical haulage roads, holes for shelter shall be cut into the strata at least every thirty yards, not less than two and one-half feet deep, four feet wide and level with the road. These refuge holes must be kept whitewashed and clear of obstruction; except in entries where rooms are driven at regular intervals not exceeding ninety feet.

Portage, Penn.

JEROME C. WHITE.

A byproduct coke oven has been developed to a high degree of perfection in the United States. Nevertheless, the question has arisen among some engineers as to the prevention of waste heat by radiation. Furthermore, in the coking process the carbonization is carried on by the heat from the gases which must pass through about 6 or 8 in. of firebrick. Is this not another source of waste heat? Does it not take a longer time than necessary to carbonize the coal by this method? Would it not be well to investigate these requirements with an idea of working out details which would do away with some of this waste?

The smaller sizes of anthracite buckwheat—Nos. 3 and 4—are well adapted for raising steam under hand-fired boilers if the buckwheats are clean and a proper mixture with bituminous coal is used. These two conditions are absolutely essential. In using these mixtures it would be well to fire thin, and the green coal should be thrown on the fire when the latter is quite hot. If this method is used, a decided coking effect is secured that will produce a granulated fuel about pea coal size. The fire should be kept loose and high-pressure draft can be used to advantage. A satisfactory feature of this mixture in burning is that it tends to do away with hard clinkers; that is particularly desirable when used with stokers.



EXAMINATION QUESTIONS

ANSWERED BY
JAMES T. BEARD



Tennessee Foremen's Examination held at Nashville, Sept. 1919

(Selected Questions.)

QUES.—(a) What is firedamp? (b) What is the lowest explosive point of firedamp? (c) What is the highest explosive point?

ANS.—(a) Firedamp is any inflammable or explosive mixture of gas and air. (b) The lower explosive limit of pure methane and air is reached when the proportion of gas to air is 1:13, the mixture then containing 7.14 per cent. of gas. (c) The higher explosive limit of pure methane and air is reached when the proportion of gas to air is 1:5, the mixture then containing 16% per cent. of gas.

QUES. If you were foreman of a mine where 18 in. of drawslate overlaid the coal, what instructions would you give the men in regard to timbering?

ANS.—This is a heavy drawslate and requires to be well timbered at the face, both in entries and rooms. Good posts must be set at the sides of the entries, not more than 4 feet apart, and in rooms at least three rows of posts must be kept standing parallel to the face. The posts in each alternate row should be staggered. Special instructions should be given to the men to reset any posts that are blown out by shots, and this must be done before proceeding to load any coal. Good cap-pieces must be used over the posts. These should be set transversely in the row next the track and longitudinally over the other posts.

As the face of a room is advanced, the rear posts are withdrawn and the slate allowed to fall in the waste and over the road. Permanent timbers must then be set to support the roof over the road. If the coal is cut by machines, it may be necessary to draw and reset each post in the first row as the machine advances along the face. This will depend, however, on the strength of the slate and to what degree it is self-supported.

QUES.—What dangers arise from lack of judgment in locating shots?

ANS.—When a miner uses poor judgment in locating a shot, there will be danger of the charge blowing the tamping and not breaking down the coal, or much of the coal may be blown into small fragments. In the former case, the charge is laid too deep on the solid and, as a result, the line of least resistance is along the axis of the hole, which causes the tamping to yield before the coal is broken down. In the latter case, the charge is laid at too shallow a depth and the force of the blast completely shatters the coal.

It may happen that a shot will seam out instead of breaking down the coal, owing to the charge being located in a soft stratum of the seam. At times, the poor judgment of a miner will locate a charge too close to the roof, breaking the slate and making the top dangerous for future work.

QUES.—What conditions determine the width of rooms and entries?

ANS.—The width of entries is determined chiefly by the character of the roof and coal, thickness of seam, depth of

cover, nature of bottom and the intended use of the entry. Airways must have a sectional area sufficient to pass the required volume of air at a suitable velocity. On this account, airways driven in a thin seam will often have a correspondingly greater width to avoid the expense of taking down top or lifting bottom to secure the necessary area.

The width of haulage roads must be sufficient to give a good clearance on one side of the road, sufficient to permit men to pass the loaded cars where the road is required to be used as a traveling way. Again, a haulage road driven in a thin seam will often require a greater width, in order to give room for stowing the material taken down from the roof or lifted from the bottom to make the necessary headroom on the road.

In driving rooms, the relative width of opening and pillar is determined by the nature of the roof, floor and coal, depth of cover, thickness and inclination of seam and, to some extent, by the presence of gas or water in the strata and the manner in which the coal is to be mined.

QUES.—What percentage of relative humidity would you consider necessary in a dry and dusty mine?

ANS.—The relative humidity of mine air is of more importance in its relation to the human system than in respect to its rendering the dust of a mine less dangerous. Even a hundred per cent. of relative humidity, which represents a saturated condition of the mine air, would not be sufficient to render the fine dust generated in a mine an element of no danger. It has been shown that, to reduce the dust danger in mines, requires the thorough saturation of the dust with water, which would not be possible to accomplish by maintaining a saturated condition of the mine air. On the other hand, a high percentage of moisture in the air weakens the workmen. The best physical condition of mine workers is attained when the relative humidity of the air does not much exceed 60 per cent.

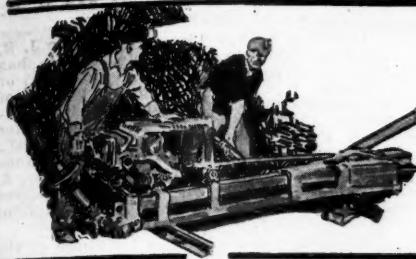
QUES.—What quantity of air will be required to ventilate a mine working 250 men, 12 mules and using 3 gasoline haulage motors?

ANS.—If the mine is generating firedamp, the Tennessee mining law requires 150 cu. ft. of air, per man, per minute, and 600 cu. ft., per mule, per minute, which would mean a total circulation of $250 \times 150 + 12 \times 600 = 44,700$ cu. ft. of air per minute.

In a dusty mine, only, the law requires 100 cu. ft. per man and 500 cu. ft. per mule, which would mean a total circulation of $250 \times 100 + 12 \times 500 = 31,000$ cu. ft. of air per minute.

In mines generating neither gas nor dust in dangerous quantity, the law requires 85 cu. ft. of air, per man, and 500 cu. ft. per mule, which would mean a total circulation of $250 \times 85 + 12 \times 500 = 27,250$ cu. ft. per minute.

Nothing is said in the law in respect to the circulation required by the use of gasoline locomotives on haulage roads. In the opinion of many competent mining men, these should never be permitted. There is however a wide difference of opinion upon this subject and the increasing use of these machines will doubtless sooner or later call for some legal provision covering their air requirements.



COAL AND COKE NEWS

Charleston, W. Va.

Best car supply in southern coal fields of the state in recent months. Output 75 per cent. New River field fares well, car supply well maintained all week. About 75 per cent. car supply in Kanawha region.

Favored with a car supply far superior to any furnished in recent months, mines in central southern West Virginia pushed production up several pegs during the week ended Oct. 11. On a general estimate, taking the state as a whole, it may be safely stated that the output was approximately 75 per cent, possibly somewhat in excess of that. When work was begun in some of the fields in this section on Oct. 6 there was more than a 100 per cent. car supply, representing a Sunday accumulation. While the supply was smaller during the other five days of the week, the surplus supply of Monday tended to increase the average for the six-day working period. With mines able to be operated with more regularity, the shortage of men in the various fields made itself somewhat more manifest, though not as yet alarmingly large.

The New River field was one of the districts furnished with more than a 100 per cent. car supply on Monday, Oct. 6. Consequently this district fared better than a good many of the neighboring fields, although there was an increased supply of cars available in such fields. Contrary to the usual state of affairs, the run of cars was well maintained throughout the week, enabling operators to more nearly meet the demand, although no one had any coal to spare or indeed enough to take care of contracts and at the same time supply any free coal in the open market.

Benefits accrued in the Kanawha field during the week ended Oct. 11 when the Chesapeake & Ohio R. R. succeeded in keeping the supply of empties up to a much higher level than usual; the supply averaged in the neighborhood of 75 per cent. throughout the week, production consequently amounting to about 150,000 tons. This represented a gain of about ten per cent. over the previous week, operations as a natural sequence being much more regular.

Fairmont, W. Va.

Coal loading reached top notch in Fairmont region for week ended the eleventh. Despite Curtis Bay embargo and irregular Lake demand. Heavier inland Western tonnage. Monongahela R. R. furnished 100 per cent. car supply.

Despite the fact that the Fairmont region was threatened with a shortage of cars at one or two points during the week ended Oct. 11, and despite the fact that there was an actual slump about the middle of the week, reports from the entire region indicate that the loading of coal (for the year) reached the top notch during the period ended the eleventh. This was accomplished also in spite of the fact that shippers were laboring under several handicaps. In the first place shipments to Curtis Bay were debarred except under special permit, and in the next place the demand at the Lakes was very irregular. Yet operators managed to meet such conditions and to increase the production for the week without resorting to storage.

Heavy shipments during the first three days of the week ended the eleventh counted in favor of increased production for the week as a whole. For

example, while 115 cars were shipped to the Lakes on the eighth, the number had dwindled to 15 the next day. There appeared to be a heavier tonnage bound for inland western markets, however, than during the earlier months of the year. The tonnage of coal shipped for railroad use was not as large as might have been expected.

Trouble has been experienced in keeping Curtis Bay clear of congestion, but the Baltimore & Ohio has announced that it will put one of its old piers there in commission again. Boats furnished have not been adapted to prompt loading. This will be remedied as far as possible, it is announced.

The improvement in the car supply was not confined to the Fairmont region, other northern West Virginia fields also receiving a larger run of cars. The Monongahela R. R. was able to furnish its mines with nearly a 100 per cent. supply of cars throughout the entire week, and, while cars were not so plentiful in other parts of northern West Virginia, there was a visible improvement over September.

Bluefield, W. Va.

Continued decrease in Pocahontas production. Transportation disabilities increasing while man power losses are being reduced. Output 60 per cent. Production gains in the Williamson field. Kenova-Thacker tonnage now same as mined during the same period of 1918.

Production slipped back again in the Pocahontas district during the week ended Oct. 11, it being the second consecutive week in which decreases in production have been observed; the loss as compared with the week ended the fourth being 11,000 tons or the difference between 316,000 and 305,000 tons. In other words, the loss in production since the week ended Sept. 27 now amounts to 60,000 tons. During the week ended the eleventh, increased railroad disabilities cut deeper into production, the increased loss from such a source being 33,000 tons; car shortage losses having ascended from 32,000 to 115,000 tons, although there was a 3,000-ton increase in the loss from general causes, while man power losses were being reduced.

It is probable that the eastern embargo reduced shipments to some extent, cutting off as it did export tonnage, which has been quite heavy recently, for a period of two days. For a time the output of the Pocahontas region was on the increase but transportation difficulties are now holding it down to approximately 60 per cent. Of course under present conditions it is absolutely impossible for Pocahontas producers to even approximately meet the demand for their coal or to take care of contracts, there being a strong continued demand for that kind of fuel.

While production was on the down grade in the Pocahontas region, the reverse was true in the Williamson field, where there was a gain in the output of 4,000 tons, although the car shortage was still entailing a production loss of 25,000 tons. The increase was achieved also despite the fact that the working time of 2,655 hours was even less than during the week ended Oct. 4. Under such conditions production was maintained at about 72 or 73 per cent, with an excellent demand in evidence for coal from this district, and with prices about on a par with those of previous weeks. About the same tonnage is now being produced in the Kenova-Thacker district as was mined and loaded during the same period of 1918.



Huntington, W. Va.

Decrease in output of Logan field due to greater car shortage. Eastern embargo sends entire Guyana production to the West for two days. Later heavy export shipments resumed. Possible labor trouble multiplies inquiries in Logan field. Coal moved by C. & O. for week ended the eleventh was 689,950 tons.

Slight retrogression of production was witnessed in the Logan mining district during the week ended Oct. 11, the output falling off about 8,000 tons. Such a decrease was attributable altogether to an increase in the car shortage; the weekly output was held down to 65 per cent. of capacity as against 66 per cent. for the previous week. There was an increase in the car shortage loss of about 11,000 tons, and the time lost from the same cause was two hundred hours heavier (to an hour) than the loss during the previous week.

In respect to labor shortage, there was an improvement, but increased mine disability was apparent, the total loss being about 4,000 tons heavier than during the week ended Oct. 4. During the weekly period ended the eleventh, a two-day embargo affected shipments to some extent, no coal being permitted to be moved to eastern markets, so that it was necessary to ship, during a third of the week, the entire production of the Guyana field to the West. By Monday, Oct. 13, the embargo on eastern shipments had been lifted and the heavy export shipment of coal had been resumed.

Steam coal was in brisk demand, as were all other grades, present business conditions failing to affect production or shipments. Following the announcement that miners and operators had broken off negotiations at Philadelphia, inquiries in the Logan field were multiplied, it being apparent that many buyers were much perturbed about their future supplies of coal and were endeavoring to make arrangements for a sufficient supply to tide them over an emergency.

The increase in the amount of coal transported by the Chesapeake & Ohio during the week ending Oct. 11, over the previous week, was in excess of 200 cars, coal loading for the latter week being 13,799 cars, while during the week ending Oct. 4 the number of cars handled was only 13,587. Transportation of 13,799 cars meant the handling of 689,950 tons of coal.

Pottsville, Penn.

Plans under way by anthracite operators to secure benefits of daylight-saving next year. Law repealed had proved beneficial. Many cities and industrial sections plan to take action as to daylight saving during next year.

Passage of the repeal of the daylight saving law by Congress was heralded in the anthracite region with chagrin by both operators and miners, and plans are under way to conduct the industrial affairs of this region next summer just as though the law had not been repealed. It is said that the collieries will start to work an hour earlier and all industrial establishments will be asked to do likewise.

An anthracite correspondent states that "the daylight saving law made possible the greatest revival of baseball the region ever witnessed. By the additional hour of sunlight it was possible for the young miners to finish their work, get their evening meal and participate in the games without any

undue difficulty. Much of this pleasure would have to be foregone by this element of the mining population unless an early working hour is fixed upon next summer." The operators are reported to have said that the law had a beneficial effect upon the population in the anthracite region and helped to keep down the spirit of unrest so manifest here as elsewhere. They declare its repeal was a great mistake upon the part of Congress.

In this connection there has been a move on the part of some to have the early hour for commencing work in force the year around. This question has been commented upon editorially in the columns of COAL AGE and objection was raised to getting the employees out to work at an unusually early hour on cold winter mornings. However, during the months in which the daylight-saving law has been operative for the last two years, the satisfaction with its practical working has been general in cities and in most industrial centers. Some urban communities are planning to enact an ordinance to secure daylight saving next year. Possibly many industrial sections will take similar action.

Columbus, Ohio

Wash rooms for miners of State of Ohio required by act of General Assembly. Conditions of the measure. Chief Deputy of Mines, Jerome Watson, calls the attention of operators to this act.

An act was passed by the Eighty-third General Assembly of Ohio to supplement Section 934 of the General Code by the enactment of Section 934-1, requiring washrooms to be provided and maintained at coal mines for the use of employees. The act further states: "Every owner, operator, lessee or agent of a coal mine, where five or more persons are employed, shall provide and keep in repair a wash room, convenient to the principal mine entrance, adequate for the accommodation of the employees, for the purpose of washing and changing their clothes when entering and returning from the mine. Such wash room shall be properly lighted and heated, supplied with warm and cold water and adequate and proper facilities for washing purposes." It is further stated, "This act shall take effect and be in force from and after Apr. 30, 1920."

Under date of Oct. 7, 1919, the Chief Deputy and Safety Commissioner of Mines of Ohio, Jerome Watson, addressed a letter to the operators of the state calling their attention to this act. He comments that "The Mining Department realizes that some time will be required to build and equip wash rooms such as will be necessary to adequately furnish accommodation for the miners at the various mines of this state, and we respectfully call your attention to this act, and earnestly request your co-operation in seeing that this law is complied with."

For some years the more progressive coal companies throughout the principal mining fields of the country have provided wash and change houses for their men convenient to the principal mine openings. This act of the State of Ohio calls to mind a notice which at one time was posted in a certain Norfolk & Western R. R. station near the Pocahontas coal field of West Virginia, which read, "Gentlemen will not smoke here, others must not."

Personals

Charles M. Shinn, heretofore district engineer of the Consolidation Coal Co., with headquarters at Fairmont, W. Va., has been appointed superintendent of mine No. 37 of the company. He succeeds A. D. Woodford, resigned. Mr. Shinn has been connected with the engineering department of the Consolidation company for the last 15 years. He was a lieutenant in the artillery corps during the war.

Henry O'Neill has been named as superintendent of mines Nos. 27 and 48 of the Consolidation Coal Co. at Glen Falls, Harrison County, W. Va. Mr. O'Neill was promoted from the post of

assistant superintendent at Berryburg, Barbour County, W. Va.

B. G. Ash, who has been acting as superintendent of mines 27, 48 and 25, has been relieved of the responsibility of supervision over the first two named operations in order to give his entire time to mine No. 25 at Clarksburg, W. Va. He was succeeded at Nos. 27 and 48 by Mr. O'Neill.

R. J. Stegal entered upon the discharge of his duties as auditor, in charge of all accounts of the Geo. M. Jones companies in Logan County, W. Va. Mr. Stegal was up until Oct. 1, County Clerk of Fayette County, W. Va. He was at one time purchasing agent for the New River Co. with headquarters at Macdonald, of the same state.

George M. Wolfe, heretofore general superintendent in West Virginia of the operations of the Jamison Coal and Coke Co., is now Philadelphia manager of the operations of the Operators' Fuel Agency. Before he left Fairmont he was presented with a handsome gold watch by employees of the Jamison company as a token of their friendship and regard.

James W. Darville, who for the past two years has been sales manager of the Industrial Coal and Coke Corporation, No. 1 Broadway, New York City, has resigned his position with this concern on Oct. 1.

F. R. Wadleigh has become associated with the Dodson interests as consulting and expert engineer. The Weston & Dodson Co., Inc., and the Dodson International Coal Corporation announce that the addition of Mr. Wadleigh to their Industrial Research Department Staff will add to the value and scope of its work; while his wide knowledge of the coal export trade, foreign coals and markets, will be of distinct value in placing the coals of this country in foreign markets.

Obituary

Arthur Haye Storrs died at Pelham Manor, N. Y., on Sept. 22. He had been in poor health and it is supposed that he fell in the water while walking along the shore and was drowned. Mr. Storrs was identified with anthracite mining for many years as an engineer, with headquarters at his home city, Scranton, Penn.

Dr. D. M. Halley, pioneer coal operator of Oklahoma, who was associated with Col. J. J. McAlester in sinking the first shaft in the McAlester field, died at his home in McAlester, Okla., on Oct. 15. As a mark of respect all coal mines in Oklahoma, under jurisdiction of the Oklahoma Coal Operators' Association, ceased work for five minutes at 3 o'clock on the afternoon of Oct. 16, at which hour the funeral was held. He had been actively associated with the Oklahoma coal mining business since 1898, being president of several companies at the time of his death.

Industrial News

Zanesville, Ohio—The Ohio Standard Coal Co., of this place, has been incorporated with a capital of \$50,000. The incorporators are: Arthur W. Sieglaff, H. A. Taylor, Gus G. Katsampes, H. A. Sharpe, B. S. Goldman and P. H. Tannehill.

Clemens, Md.—The Morgantown-Salkelt company, of this place, is making extensive preparations for the development of a large tract of coal. The concern is composed of Pittsburgh interests and Roy Salkelt is one of the chief owners.

Martins Ferry, Ohio—Former Congressman W. B. Francis, of this place, is at the head of a \$200,000 coal company, which has purchased the holdings of the Yukon & Pittsburgh Coal Co. in Meigs County of this state.

Charleston, W. Va.—The Castle Falls Coal Co., of Clarksburg, W. Va., was incorporated to operate mines in Taylor County of this state, with capital stock of \$50,000. The incorporators are: John A. Washington, H. B. Cooper, C.

H. Harris, W. I. Shippellett and P. W. Bailey, all of Clarksburg.

Buffalo, N. Y.—The mine of the J. B. Jenkins Coal Co., at Mabie, W. Va., has been sold to the Randolph Coal Co., of Elkins, W. Va. It has an output of about 100,000 tons annually and employs 100 men. The principal owner was F. P. Merrill, of Hornell, N. Y., but the management was in the hands of General Sales Agent Charles A. Storck, with an office in this city, where it has been since the organization of the company.

Lisbon, Ohio—All the holdings of the Canton Akron Coal Co., including coal lands, leases, mining and personal property, were sold by W. O. Wallace and J. E. Morget, the receivers of the company. The new owners are: L. D. Blanchard, N. E. Wise, F. M. Schumaker and W. M. Gailey.

Charleston, W. Va.—The Davenport Coal Co., of Charleston, has been incorporated to operate mines in Kanawha County, with a capital stock of \$300,000; incorporators, Maurice E. Preisich, Isaac S. Given, Elbert E. Johnston, W. H. Farmsworth, Lewis H. Manley and Ormus Davenport, of Buffalo, N. Y.; Geo. R. Stephens, of Lancaster, N. Y.; Geo. J. Brendel, of Hamburg, N. Y., and Godfrey E. Heizer, of Orchard Park, N. Y.

Louisville, Ky.—A rumor from Madisonville, Ky., originating in "The Hustler," the principal newspaper of that city, is to the effect that Eastern capitalists are planning a merger of some 47 large coal companies in that section, including mines in Webster, Christian, Muhlenburg, Hopkins and Union counties. It is alleged that the deal will involve a capital of \$50,000,000. The rumor states that investigation of conditions has been under way for some time past, and that options are thought to have been secured on several mines. Another rumor is to the effect that the men behind this organization have plans for developing southern coal markets by the Ohio River waterway.

Coming Meetings

American Society of Mechanical Engineers will hold its annual meeting Dec. 2-5 in New York. Secretary, Calvin W. Rice, 29 West 29th St., New York City.

Canadian Mining Institute will meet Nov. 26-28, in Vancouver, B. C. Canada. Dr. E. T. Hodge, professor of geology at the University of British Columbia, has been appointed general secretary of this meeting.

Coal Mining Institute of America will hold its 33rd annual meeting Dec. 3 and 4 at Pittsburgh, Penn. Secretary, H. D. Mason, Jr., Mine Safety Appliance Co., Pittsburgh, Penn.

American Mining Congress will hold its annual convention at the Planters' Hotel, St. Louis, Mo., Nov. 17-21. Secretary, J. F. Callbreath, Muncey Building, Washington, D. C.

Trade Catalogs

Steam Turbine Blading. Allis-Chalmers Co., Milwaukee, Wis. Pp. 26; 8x10 1/4 in.; illustrated. Bulletin No. 1104. Details of steam turbine blades, different types and notes on tests.

Harvard Engineering School. Harvard University, Cambridge, Mass. The official register of the University. Unillustrated; pp. 72; 5 1/4 x 7 1/2 in.

Sawyer Belt Hooks and Wedges. Sawyer Belt Hook Co., Pawtucket, R. I. Price list No. 9. Pp. 52; 4 1/2 x 7 1/2 in.; illustrated.

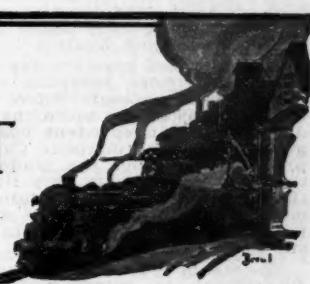
Five Hundred Business Books. By Ethel Cleland, Librarian, Business Branch Indianapolis Public Library, American Library Association, Library War Service, Washington, D. C. Unillustrated; pp. 72; 6x9 in.

Bibliography on the Roasting, Leaching, Smelting and Electrometallurgy of Zinc. School of Mines and Metallurgy, University of Missouri, Rolla, Mo. Illustrated; pp. 388; 6x9 in.



MARKET DEPARTMENT

EDITED BY ALEX MOSS



Weekly Review

The threatened strike of bituminous miners scheduled for Nov. 1 appears to have stimulated the buying of soft coal to a certain extent. While orders have not increased to the volume expected by jobbers and wholesalers, indications are not lacking that consumers who have been lethargic in the matter of their coal purchases are now anxious to obtain a reserve supply in the event that the Government does not intervene in the present situation and prevent the miners from stopping work. The Government, as a large consumer of coal, is vitally interested in the wage controversy, in that practically all of its contracts provide for the addition to existing contracts of any general wage increases that may be granted.

Prices of soft coal are advancing slowly. Of course, consumers who were wise enough to contract for their requirements are not affected by the increases. It is only those buyers who come into the market from time to time and pick up odd lots of "free" coal who are hard hit.

At the New York piers the receipts of soft coal have been somewhat upset by the effects of the longshoremen's strike. Embargoes were placed on coal shipments for days at a time, and some factors were obliged to route their coal in other

directions. Boats have accumulated, and dispatch to New England and points on Long Island Sound are much slower the present week. The market in New England, however, is still much restricted, for stocks are ample.

In the Middle West business is booming. Factories that have hitherto been burning coal from their storage piles are now coming into the market and frantically requesting operators to ship them coal. It must be said in all fairness, however, that operators are not taking advantage of the present situation to boost prices or indulge in profiteering.

Though threatening to strike, the bituminous miners are producing more and more coal. The output for the week ended Oct. 11 is estimated at 11,924,000 net tons, which is greater by 311,000 net tons than that of the first week in October, which had hitherto been the highest this year.

All of the domestic sizes of anthracite are being called for urgently. Steam coals continue to drag and the market in these grades shows just the slightest improvement. The production of anthracite during the week ended Oct. 11 is estimated at 1,955,000 net tons, an increase of 34,000 net tons

BOSTON

Prices swing upward. Market still restricted. Sharp demand for transportation. Longshoremen's strike in New York causes embargoes. Impression locally that bituminous mines may suspend, but buyers largely indifferent. Hampton Roads situation unchanged. Anthracite needs urgent.

Bituminous—This week shows a pronounced lift in prices for shipment all-rail. Ordinary grades from Central Pennsylvania are now quoted at \$3.20@3.35 per net ton f. o. b. mines, all prices being made subject to prior sale. A few conservative operators are disinclined to ask much if anything over the yearly contract basis on the ground that "profiteering" would not put them in a favorable light with mine-workers who are agitating for an increase in wages. In any case, prices as a whole range distinctly higher than a week ago.

The market in New England, however, is still much restricted. Stocks are ample and what spot demand appears is mostly confined to tide-water consumers who are anxious over the prolonged strike of engineers on the ocean tugs. The trade is therefore confronted by a situation where prices are rising but without any broad market.

The continued strike of the tow-boat engineers has created a shortage in transportation that for the time being is causing a sharp demand for steamers. Several shippers have commitments along the coast that were based upon barge delivery and in some quarters there is enough local anxiety to cause a certain urgency for prompt steamers from Hampton Roads. While a few additional steamers have been allocated the coastwise trade, a number of those already engaged are unfit for winter service and will soon have to be withdrawn. The anthracite situation also has a bearing on the demand for steamers at ports like Boston, Providence and Portland.

At the New York piers the receipts of coal have been somewhat upset by the effects of the longshoremen's strike a week ago. Embargoes were slapped on and for some days shippers were obliged to route their coal in other directions. Boats accumulated and despatch is somewhat slower during the present week.

The trade here is under the impression that there will be some sort of suspension in central Pennsylvania beginning Nov. 1. It is felt that mine workers have been very well treated the last two years especially, and with stocks so ample at most points it may not be a bad thing to have the issue brought to a conclusion. Certainly there are few buyers in this territory who have more than a passing interest in the current market.

No material change is observed at Hampton Roads or in New England with respect to the coal trans-shipped at the Norfolk and Newport News piers. On all but a relatively small portion of the tonnage coming to New England, steamers are used and receipts are about the same as hitherto this season. If there were transportation available it is probable there would be some mild scurrying to get cargoes arranged for prior to Nov. 1, but the agencies seem quite hopeful that there will probably be no suspension in the West Virginia smokeless fields.

Current prices on bituminous at wholesale range about as follows:

Cambrias and Clearfields Somersets

| | | |
|--------------------|-------------|-------------|
| F. o. b. mines, | | |
| net tons..... | \$2.85@3.35 | \$3.15@3.60 |
| F. o. b. Phila., | | |
| gross stons.... | 5.05@5.60 | 5.35@5.90 |
| F. o. b. New York, | | |
| gross tons.... | 5.40@5.95 | 5.75@6.25 |
| Alongside Boston | | |
| (water coal), | | |
| gross tons ... | 7.00@7.75 | 7.60@8.00 |

Pocahontas and New River are practically out of the market for coastwise shipment, but \$6.25@7.00 is quoted as the range for export.

Anthracite—The hard coal trade is still proceeding under difficulties. Those dealers in position to handle steamers are managing to make up their arrears in that way, but those dependent upon railroad-owned barges are hard put to it to eke out a current supply. Many of the individually-owned barge lines are in operation and such boats together with extra deliveries all-rail are keeping dealers going, but there are certain points on the Maine coast where the needs are urgent.

NEW YORK

Chestnut size the shortest, with egg and stove in good demand. The harbor situation delays deliveries and causes much uneasiness among the dealers. The call for the steam sizes becomes stronger and prices stiffen. Accumulations of bituminous prevented by strikes and embargoes on shipments to tidewater. Consumers here well supplied and show no anxiety regarding the outcome of the wage conference.

Anthracite—All of the domestic coals are in heavy demand. Chestnut, which has been hard to move in this market for the last few months, is now on a parity with egg and stove and nearly as hard to get as either of those two sizes were a few weeks back. This is, however, the usual occurrence in October when because of the small orders placed by consumers the peddler trade picks up and results in heavy buying of chestnut.

Deliveries have been considerably delayed throughout the week by harbor labor troubles, some firms reporting no coal moved from the docks in five days. Other dealers have been more fortunate however, and comparatively few complaints have been heard. Retailers as a rule deplore the tie-up at this time of the year, claiming that with coal moving freely they would have been able to clean up their outstanding orders in a few weeks.

Shipments from the lower ports have been delayed considerably more than have those from the upper ports because of the long hauls.

Retail dealers here are depending almost entirely on company coals and for independent coals where they are not required to pay more than the 75¢ differential. Independent coals are in good demand throughout Canada and premium coal and the trade believes the West. One hears very little about that with production maintained at the present level premium coals will disappear from the market within the next six weeks.

The steam coals are in good demand. Buckwheat is bringing full prices. Rice is not in over supply, while barley is the hardest size to move.

One hears frequently of heating plants being changed to use oil instead of coal, but the tonnage so far affected is comparatively small. However, the trade is watching the situation closely.

Bituminous—Labor troubles have kept the shipments to this market down to actual needs and aided by the delay in having shipping permits renewed accumulations have been kept at a minimum.

The trade here is not showing much anxiety as to the outcome of the wage negotiations. Another factor is that most consumers have large stocks on hand and do not believe that should a strike be called it will last long enough to clean up their supplies.

The lack of tonnage here has caused prices to stiffen and quotations nowadays depend much upon the supply and the urgency of the buyer. Some dealers say that prices have changed several times during each 24 hours. However, with the local harbor difficulties settled dealers expect a boom in demand which it may be hard to fill. This may also result in a further strengthening of prices.

Exporters of coal have been hard hit during the past week. The present harbor troubles have caused many vessels to go to Philadelphia or Baltimore for their bunker supplies and has also resulted in a considerable loss to this harbor in the number of orders which have been filled at either of the two southern cities.

Dealers in bunker coals have also suffered because of the strike, there being no means for supplying vessels.

The high grade coals are hard to obtain, most of them being consigned on contracts.

Quotations on pool coals at this harbor range about as follows:

Nos. 1, 9 and 71, \$5.85 to \$6; No. 10, \$5.60 to \$5.75; No. 11, \$5.40 to \$5.55, and 18 and 41, \$6.10 to \$5.25.

The quotations for coals at the mines for spot delivery range about as follows:

| | |
|----------------------------|------------------|
| So. Forks (best)..... | \$3.25 to \$3.50 |
| Cambria (best)..... | 3.00 " 3.25 |
| Cambria (ordinary)..... | 2.60 " 2.90 |
| Clearfield (best)..... | 3.00 " 3.25 |
| Clearfield (ordinary)..... | 2.60 " 2.90 |
| Reynoldsville..... | 2.85 " 2.90 |
| Quemahoning..... | 3.25 " 3.50 |
| Somerset (medium)..... | 3.00 " 3.25 |
| Somerset (poor)..... | 2.50 " 2.75 |
| Western Maryland..... | 2.50 " 2.75 |
| Fairmont..... | 2.25 " 2.50 |
| Fairmont ½..... | 3.10 " 3.25 |
| Latrobe..... | 2.60 " 2.90 |
| Greensburg..... | 2.75 " 3.00 |
| Westmoreland ½..... | 3.40 " 3.50 |
| Westmoreland r-m..... | 2.75 " 3.00 |

PHILADELPHIA

Anthracite moving smoothly. Mild weather causes light consumption. Dealers want egg, stove and nut. Plenty of orders yet unfilled. Premium prices being paid for these sizes. Pea is heavy and steam sizes without real activity. Bituminous unsettled. Strike rumors do not move consumer. Some price increases.

Anthracite—Because of a mild fall to date the demand for coal has not been strong on the part of the consumer. This refers specifically to that class of consumers who have always been accustomed to buy their fuel as they needed it. While the number of persons buying in this manner has decreased, yet it is still considerable.

The call is still for egg, stove and nut, with the greatest pressure on stove and nut. Demand is also heavy for egg.

There seems to be almost no limit to the amount of these sizes that the dealers show a willingness to take. While there has been some improvement in the quantity of these sizes received during the last week, the claim is made that it is still under the normal for the time of year. It is known for a fact that New England continues to receive heavy tonnages of these sizes and frequent inquiries are received by local shippers from that point offering premiums of \$2 or even more.

It is a fact that locally those concerns buying from brokerage houses at premiums have no difficulty in getting prompt shipment and the higher the premium the quicker the coal comes. Some of the city retailers will not handle coal at premium prices, while others are taking in considerable quantities and simply passing the increased prices on to the consumer. Often in order to get the favorite sizes it is necessary in addition to the premium to take some pea coal.

One reason for the dealers' anxiety to get stove and nut at this time is the fact that they have partially filled many orders and they need additional coal of the same size to complete them before they are in position to render a bill.

The big companies are still experiencing much trouble with pea coal and have their salesmen out urging dealers to take this size. The dealers are also endeavoring to have their customers accept this size and there are reports of considerable success in this direction. There is not the least doubt that with the coming of more seasonable weather this size will move of its own accord.

The steam sizes are still laggard. Even buckwheat fails to exhibit any particular strength. It necessarily follows that rice and barley are even more inactive. There was a little show of activity in the steam sizes this week due to the uncertain conditions in the soft coal market over the labor situation.

Bituminous—The soft coal situation is uncertain. The fact that the operators rejected the proposition of the miners for increased wages, etc., has had a tendency to strengthen the market, but it is merely a tendency, for there has been nothing like a rush to buy coal. Every manufacturing plant of any size has heavily stocked and for this reason is not at all anxious to add to their stock, even with a possible strike in view.

As a matter of fact the consumer refuses to take the strike talk at all seriously. He seems to feel that the miner is well compensated and that the wiser heads among the men will avoid calling a strike. In the spot market the trade has been particularly dull lately, as little coal has been moved in this way. Because of the breaking off of negotiations between the miners and operators there was an inclination to increasing prices, and at this time the prevailing figures were about as follows:

| | |
|-----------------------------------|---------------|
| Georges Creek Big Vein..... | \$3.15 @ 3.30 |
| South Fork Miller Vein..... | 3.15 @ 3.30 |
| Clearfield (ordinary)..... | 2.80 @ 3.00 |
| Somerset (ordinary)..... | 2.75 @ 2.90 |
| Fairmont lump..... | 3.25 @ 3.35 |
| Fairmont mine run..... | 3.05 @ 3.15 |
| Fairmont slack..... | 2.45 @ 2.55 |
| Fairmont lump (ordinary)..... | 3.00 @ 3.05 |
| Fairmont mine run (ordinary)..... | 2.75 @ 2.85 |
| Fairmont slack (ordinary)..... | 2.45 @ 2.55 |

BALTIMORE

Threat of coal strike sends prices upward in bituminous market. Hard coal also becomes more active. Exports booming.

Bituminous—Coal men and consumers are alike awake to the possibilities of a coal strike. With the consumers the hope is entertained that there will be an eleventh-hour settlement of the difficulty. With the coal men there is little feeling that the trouble can be adjusted without a strike in the face of the extortionate demands of the miners, and even were a compromise agreed upon by officials of both sides the feeling is strong here that a number of the miners will walk out under any circumstances. This feeling first sent the larger corporations into the field to urge early shipments on their

orders and contracts and to secure additional coal reserve; and the little fellows are now beginning to flock in. Prices have moved up steadily under this impetus and the end is apparently not yet. While there are now sales, in the nervous market that exists at present, both above and below the following list, it nevertheless about marks the average offerings to the trade, mine basis, here:

Best grade steam coals, \$3.75 to \$4; excellent coals such as run to No. 9, \$3.00 to \$3.60; No. 10, \$3.30 to \$3.45; fair to good coals, \$2.75 to \$2.90; mixed coals, \$2.40 to \$2.50. The best three-quarter gas is running at from \$3.40 to \$3.60; Fairmont, low sulphur, \$3.25 to \$3.35; medium sulphur, \$3, and run-of-mine about \$2.50.

Exports continue to boom. The total loading for the first eighteen days of October on foreign account ran to a total of 336,816 tons, with 41,099 tons of that amount for bunker and the balance on cargo account.

Anthracite—The hard coal situation is more active, after a period of inactivity. Fear that the strike may touch the hard coal situation in some way, and cooler weather are both causing new orders. Stove coal continues scarce. The dealers here report but a fair reserve supply in other sizes.

Lake Markets

PITTSBURGH

Strike prospects preponderate slightly. Some consumers fairly stocked. Restricted consumption by steel industry continues. Prices higher.

There is nothing but guessing as to whether or not there will be a coal strike Nov. 1. The prospects are not materially changed since the actual issuing of the strike orders by headquarters. In local circles there seems to be a slightly predominating view that there will be a strike. There has been more buying of coal of late by consumers desirous of stocking up, and the small and moderate sized consumers are believed to have sufficient stocks to carry them through a strike of a few weeks' duration. The large consumers, however, have no stocks as a rule, it being an expensive thing for the average large consumer to operate on stocks, almost a physical impossibility indeed on account of the scarcity of labor.

Were it not for the large curtailment in coal consumption due to the iron and steel strike the district undoubtedly would be able to supply the demand fully. As it is, the demand has produced a mild advance in prices, the market being now quotable as follows: Slack, \$2.20 @ 2.30; steam mine-run, \$2.30 @ 2.40; gas mine-run, \$2.50 @ 2.70; prepared gas, \$2.90 @ 3.10, per net ton at mine, Pittsburgh district.

BUFFALO

Bituminous slow of sale. New York state buys moderately, Canada hardly at all. A general waiting for the steel strike to end. It is about at an end here. Anthracite all to the lakes.

Bituminous—The situation is much the same. Consumers appear to have a pretty good supply and are not anxious to stock up. Somehow they often still have the notion that prices are going to be cheaper. The trade has no such idea. All that the jobbers are trying to do is to keep it from going higher. This is easy now, for the tendency is to slack off. Orders are not plenty anywhere and they are not likely to improve till there are more workers in the steel trade to consume the coal.

As it looks here the steel strike is coming to nothing and will soon be a matter of the past. The furnaces are steadily getting more men and are running stronger from day to day. The ore cargoes that were tied up at the docks are being unloaded. The strikers are making no demonstrations and the indication is that most of them never wanted to strike. Next week ought to see the plants running practically full time. Then the coal trade will resume its normal condition and

things will go forward on a basis that includes no immediate prospect of a strike.

The threat of a bituminous miners' strike does not seem to disturb the coal consumers. They say that the prospect therefor is not good and they do not want to stock up any more in anticipation of it. This means also that the stocks are plentiful. Salesmen say that a better trade is possible in this state than in Canada, though they do not quite know the reason for it. The situation at the mines is not good. The men work in a hap-hazard way, but manage to get out as much coal as is wanted. Present fear of a strike is not general.

Bituminous prices are not strong, but jobbers continue to quote as before, \$4.55 for Allegheny Valley sizes, \$4.80 for Pittsburgh and No. 8 lump, \$4.65 for same three-quarter, \$4.20 for mine run, \$4.10 for slack, \$4.60 for smokeless, \$5.70 for Pennsylvania smithing, all per net ton, f. o. b. Buffalo.

Anthracite—The local trade appears to be waiting for the Lake season to close, just as it did last year. Last week the supply afforded the city was next to nothing and only enough for three days is promised this week. Consumers are well supplied and it is likely that a week's shipment to the Upper Lakes will be turned in here after winter closes the lakes. It was done last year and the demand was soon satisfied. Through rail shipments are also light, likewise waiting for the lakes to close.

Prices of anthracite in this market continue on the former basis for regular, with independent prices at 75 cents to \$3 premium:

| | On Cars, Gross Ton. | At Curb, Net Ton. |
|-----------|---------------------|-------------------|
| Grate | \$8.55 | \$10.20 |
| Egg | 8.80 | 10.65 |
| Stove | 9.00 | 10.85 |
| Chestnut | 9.10 | 10.95 |
| Pea | 7.45 | 9.30 |
| Buckwheat | 5.70 | 7.75 |

TORONTO

Receipts of anthracite light. Striking coal drivers return to work. Plenty of bituminous on hand. Prices advanced.

There is practically no change in the coal situation with the exception of an advance in the price of bituminous. Receipts of anthracite from the mines continue light and dealers are much behind in deliveries. The coal drivers who went on strike returned to work on the 14th, some of the yards having conceded the demands for an increase of \$4 per week, each firm dealing with its own employees. There is an ample supply of bituminous, but the demand remains comparatively light. Quotations for short tons are as follows:

Retail

| | |
|--|---------|
| Anthracite— | |
| Egg, stove, nut and grate..... | \$12.50 |
| Pea..... | 11.00 |
| Bituminous— | |
| Steam..... | 8.75 |
| Slack..... | 7.75 |
| Domestic lump..... | 10.00 |
| Cane..... | 11.50 |
| Wholesale, f. o. b. cars at destination: | |
| Three-quarter lump..... | 6.50 |
| Slack..... | 5.50 |

CLEVELAND

Demand for all grades continues unabated and unsatisfied. Steam-coal prices have shown decided strength and are advancing. Supplies of all grades, especially bituminous, in the past few days have been curtailed because of decreased efficiency at the mines.

Bituminous—This grade, both for domestic and steam use, has come fully into its own. The shortage, which appears quite acute, broke suddenly with the advent of cooler weather a few days ago. Retail dealers could use fully twice as much coal as they are receiving from the mines. Steam-coal users have developed an extraordinary desire to stock, and are prodding operators for better deliveries. Meanwhile, the supply has become limited from another source. Mine workers in the southern and eastern Ohio districts seem to be preparing for the threatened strike, and are not pushing themselves in the least. A fair-sized labor shortage for delivery and yard work is reported by some retail dealers. No. 6 slack has shot up about 50 cents a ton,

almost over night. No. 6 mine-run and No. 8 mine-run both have participated in an advance. Some of the retail grades, like Goshen and West Virginia splint, are almost impossible to obtain. All bituminous coal prices are firm.

Pocahontas and Anthracite—Some dealers have advanced shovelled lump Pocahontas 25c a ton, making the spread \$9 to \$9.50. It is difficult to get any of this coal at the lower figure. The cool weather the last few days has brought out greater demand for both grades. Recently, with weather exceptionally good, demand fell off just a trifle, giving dealers an opportunity to catch up. Demand for both Pocahontas and anthracite is easily twice the supply.

Lake Trade—September shipment of 2,360,667 net tons of bituminous coal to the Upper Lakes brought the season's total loading to Oct. 1 up to 17,681,223 tons. At Oct. 1 last year shipments stood at 20,778,250 tons. The entire season, it is believed, will not exceed 23,000,000 tons. Vessel fuel to Oct. 1 totaled 832,907 tons, 145,160 tons being loaded in September. At present carriers are more plentiful than cargoes, and daily dumpings at Lake Erie ports range from 1,700 to 2,000 tons, about one-half of normal.

Prices of coal per net ton delivered in Cleveland are:

| | |
|-------------------------|--------------------|
| Anthracite— | |
| Egg..... | \$11.75 to \$11.90 |
| Chestnut..... | 12.00 " 12.00 |
| Grate..... | 11.75 " 11.90 |
| Stove..... | 11.90 " 12.10 |
| Pocahontas— | |
| Forked..... | 10.00 " 10.50 |
| Lump..... | 9.00 " 9.50 |
| Mine-run..... | 7.90 " 8.00 |
| Domestic bituminous— | |
| West Virginia splint... | 8.50 |
| No. 8 Pittsburgh..... | 6.60 " 6.90 |
| Masillon lump..... | 8.25 " 8.50 |
| Coshcocton lump..... | 7.15 |
| Steam Coal— | |
| No. 6 slack..... | 5.25 " 5.50 |
| No. 8 slack..... | 5.10 " 5.50 |
| Youghiogheny slack .. | 5.25 " 5.50 |
| No. 8 3/4 in..... | 5.70 " 6.00 |
| No. 6 mine-run..... | 5.25 " 5.50 |
| No. 8 mine-run..... | 5.75 |

COLUMBUS

Steam trade more active in view of the threatened suspension. The domestic trade is strong. Prices are generally well maintained while production has been increased slightly.

With a suspension believed to be certain, consumers of steam sizes are buying more actively in all sections. This tendency has been noticeable during the past week and is expected to gain as the time for the suspension approaches. While there are some reserve stocks in this territory, large users are nevertheless becoming concerned over the situation and are placing orders for immediate shipment.

Railroads are not taking any large tonnage and are not stocking up to any extent. General manufacturers are the best buyers. Steam prices are fairly strong at previous levels with mine-run from the Hocking field selling at \$2.35 and screenings around \$2. There is a good demand for West Virginia steam grades.

The domestic trade continues strong. Retailers are buying briskly in view of the threatened strike. Retail stocks are not large and there is an effort being made to increase them before Nov. 1. Dealers are having a good trade as householders are putting in their stocks. The so-called fancy grades are exceptionally strong and prices continue firm. There is also a good demand for Hocking and Pomeroy prepared grades.

Delivered prices are: Pocahontas lump, \$8.50 @ \$8.75; Pocahontas mine-run, \$7; West Virginia lump, \$7; Hocking lump, \$6; Pomeroy lump, \$6.25; Kentucky prepared lump, \$7.50.

The lake trade is progressing satisfactorily with a fairly large tonnage still moving to the Northwest. A slight falling off at several of the lower lake ports was noted during the past week. The indications point to a rather early closing of the trade, as a large part of the requirements have already been moved. Lake prices are firm. The vessel movement is generally good.

Production is increasing under the influence of a better car supply. This is most noticeable in the Hocking Valley and Pomeroy Bend districts. Eastern Ohio is still short of cars and the output is about 60 per cent. of normal. In the Cambridge and Crooksville fields the output has been about 65 to 70 per cent. and in the Hocking Valley about 75 per cent.

CINCINNATI

City is in good shape and supplies fair. Some prices have advanced while others have declined.

Cincinnati is in good shape to face a strike of bituminous coal miners, Nov. 1, if a walkout is not averted, according to wholesale and retail coal dealers. Only a prolonged strike is likely to have a disastrous effect on the city's industries and the comfort of residents. This condition is the result of Cincinnati's exceptional transportation facilities and the providence of both large and small consumers. Most industrial consumers have good stocks on hand while officials of the city, county and the public schools have enough coal to supply public institutions for some time.

Coal dealers say domestic consumers have shown much foresight in purchases this summer and fall, so that now the average stock in cellars is good. Retail prices on bituminous coal were advanced 25 cents a ton in Cincinnati last week. The lump and egg moved up to \$7 and \$7.25 a ton, delivered, and the run of mine raised to \$6.50 a ton. Coke was also raised from 25 to 50 cents per ton to a prevailing price of \$10 to \$11. However, the smokeless run of mine dropped 25 cents a ton to a range of from \$7 to \$7.50 a ton.

LOUISVILLE

Railroad Administration falling down on car deliveries. Block coal in good demand, steam slightly weaker. Mines operating three to three and a half days a week, on a 60 to 70 per cent. basis. Kentucky not expecting much labor trouble.

Although the U. S. Railroad Administration recently agreed to turn over about 180 cars daily from car pool territory, through the Pennsylvania, B. & O., and Big Four lines, to the eastern Kentucky, southern Appalachian and eastern Tennessee districts, hardly 50 per cent. of the number of cars agreed upon has been turned over so far. The car supply in the districts referred to is somewhat better than it has been, but at that mines are only operating about 60 to 70 per cent. or three to three and a half days a week.

There has been a slightly weaker market on steam coal during the past few days because of better production, and reduced demand from steel mills, and concerns affected by the steel strike. Block coal prices are good and the demand strong.

Kentucky is not expecting much trouble in event of a strike of mine workers in November. Western Kentucky is organized and is under agreement with the operators, with a contract that will carry for some time, while in eastern Kentucky organization is not strong, and operators are feeling hopeful.

Louisville retailers report that every cold day brings a good demand, and that the rainy weather of October has brought a better demand, but that sales as a whole are not active.

Kentucky mine quotations are about as follows:

Eastern Kentucky—Block, \$4 @ \$5; mine run, \$2.50 @ \$3.25; nut and slack, \$2.25 @ \$2.75. Western Kentucky—Lump, \$2.75 @ \$3.25; mine run, \$2.25 @ \$2.65; nut and slack, \$1.90 @ \$2.05; pea and slack, \$1.25 @ \$1.50.

DETROIT

Signs of increasing interest in the market for steam coal follow realization by the buyers that the mine labor situation is bad.

Bituminous—While orders have not increased in volume to the extent that jobbers and wholesalers had expected, they find indications of a larger interest in the matter of supply, taking the form of inquiries from some of the consumers of steam coal who have been

hanging back. The threatened strike of bituminous miners set for Nov. 1 appears to have jolted a number of lethargic buyers into somewhat belated realization that continuance of the operation of their plants can best be assured by having a supply of coal at hand.

Although coal is still coming into the city quite freely and in considerable amount, the transportation situation and outlook are not reassuring. Reports coming to the jobbers indicate a shortage of cars is troublesome in a number of producing districts. While some mines report better car supply, others complain that their operations are handicapped by inadequate facilities for shipping. A curtailment as large as 50 per cent. is reported from some West Virginia fields.

Free coal on tracks is moderately plentiful, but jobbers say the general local market situation is not unfavorably affected and that few sales are made at prices materially below the regular schedule.

Sales of Hocking domestic lump are reported at a price equivalent to \$3.50 to \$3.75 a net ton at the mines, with egg size holding about 50 cents less and mine-run ranging around \$2.25 to \$2.50. Slack is quoted at about \$2. Four-inch lump from West Virginia is offered at \$4. The price on West Virginia egg is 25 to 50 cents lower. Mine run is quoted at \$2.75 and nut peat and slack at \$2.25 to \$2.50. Smokeless is almost out of the market with some mine-run quoted at \$3.75.

Anthracite—Household consumers are displaying a more active interest in obtaining anthracite for winter needs, following a decided drop in temperature. They are discovering that the situation is unfavorable, that the retailers have only small quantities of anthracite in stock and that shipments ordered are slow in arriving. With some of the retailers already declining orders, numerous consumers probably will have to use bituminous or coke in house heating plants.

Coke

CONNELLSVILLE

Furnace coke advances sharply, foundry being slightly easier. Production closely regulated to requirements.

The furnace coke market has stiffened sharply, now standing fairly steadily on \$4.25. Operators were so prompt in reducing output when the iron and steel strike began Sept. 22 that as furnaces have resumed from day to day the market has been steadily recovering from its initial decline and is now higher than in June or July, though 25 to 50c lower than the average for a few weeks just before the strike.

There is practically no coke forced in the market, the last lot recorded being a week ago, a half dozen cars going at \$3.85 to save demurrage. Foundry coke is a shade easier, supplies being easy with a restriction in furnace coke production, while demand has materially decreased, and to such an extent as to lead some observers to conclude that some of the foundries are going into their stock piles.

We quote furnace coke at \$4.25, with the possibility of shading the price a few cents, and foundry coke at \$5.50@6.25, depending on brand and whether in box or open-top cars, per net ton at ovens.

The "Courier" reports production in the Connellsburg and Lower Connellsburg region in the week ended Oct. 11 at 152,764 tons, a decrease of 4,836 tons.

Coke—The demand will not be active till the furnaces are running full time. Some of them did not suspend, but there are enough of them idle to affect the consumption. This may not last long, but it affects the movement materially. Prices are still quoted at \$9.70 for 72-hr. Connellsburg foundry, \$7.70 for 48-hr. furnace, \$7.20 for off grade, \$7.45 for domestic sizes and \$5 for breeze. Iron ore is coming in at a rapid rate and though some is held up by the steel workers' strike, enough is unloaded to keep the lake fleet active.

Middle West

GENERAL REVIEW

Strong market with prices steadily advancing. Opinions differ as to possibility of a nation-wide strike of miners. Car shortage keeps many mines idle.

The last week or so has been very reminiscent of the period shortly before the United States Fuel Administration came into existence back in the summer of 1917. There is not the slightest suspicion of a weak market in any size or any kind of coal, and prices are advancing slowly but surely.

When we say prices are advancing it is rather a broad statement and ought to be qualified to some extent, as the Franklin County operators, as well as some of the operators of Indiana, are maintaining their prices at levels in effect before the present flurry arrived. These operators could sell their domestic coal at a figure far in advance of \$3.25; in fact, we know of a case where a jobber was able to get hold of a car of Franklin county coal and took advantage of the situation to peddle the coal around until it was sold at \$4 per ton f. o. b. mines. We understand that this coal was egg size. It must be said in all fairness that the operators are not availing themselves of the present situation to boost prices or go on any profiteering spree.

The labor situation continues to be an enigma. Prominent operators are found who confidently expect a strike. There are operators equally prominent in the eyes of the public and the coal trade in general, who believe that a strike at this time is impossible because the coal question is so important to the public that the authorities at Washington will, under no circumstances, allow a stopping of mining. The majority of opinions, however, seems to be that the United Mine Workers and operators will succeed in patching their differences or at least make some arrangements so that the public and the railroads will continue to be supplied with coal.

The car situation continues to occupy a prominent place; almost too prominent a place when one considers how few and rare cars are these days. The situation on the C. B. & Q. is perhaps the best in the Middle West. Some of the other lines, the I. C., C. & E. I. and Big Four are supplying their mines with only about 60 per cent. of full car supply. A number of mines are kept idle every day and loud cries are heard from all sides for more coal and better service. Reassuring bulletins appear from time to time from the "higher-ups" at Washington, but in spite of these optimistic prophecies little relief has been forthcoming.

CHICAGO

Retail dealers kept busy supplying demands. Eastern coal practically out of the market. Steam sizes being absorbed rapidly.

The retail trade in Chicago appears to be doing a rushing business. A glimpse into any of the coal yards shows the greatest amount of activity. Little independent dealers whose stock in trade consists of a motor truck and a list of friends are loading up their automobiles and delivering coal to their customers as fast as possible. Franklin County operators are besieged by dealers requesting prompt shipments. Eastern coal now is practically impossible to get, and when it is procured the price f. o. b. Chicago is so high that it is only from two to three dollars under the cost of anthracite. Eventually eastern operators are going to lose out because they are maintaining prices so high. The average householder is not going to pay from \$9 to \$10 for soft coal when he can get anthracite of the best grade for \$12 and \$13.

The weather has been mild, and according to the weather man will continue so; but when it eventually does get cold, interesting times are expected, because none of the dealers have too much coal on hand, and a cold spell will clean them up, as shipments are

not being made with any great rapidity.

The steam situation is booming. Factories that have heretofore been laying low and burning up their storage piles are now coming into the market rapidly, and frantically requesting operators to ship them coal to replenish their stock piles. Many purchasing agents are paying dearly for their indifference to the coal question during the past spring and summer months, which is just what has been predicted all along.

MILWAUKEE

Coal market quiet and uneventful. Popular sizes of anthracite out of the market. Illinois shippers behind in deliveries.

The only new phase in the coal situation at Milwaukee since the last report is a clean-up of chestnut anthracite, which, together with stove, are now out of sale. Egg, buckwheat and anthracite screenings are still to be had, however.

Prices of both hard and soft coal remain unchanged. The car situation is no better and shippers are seriously handicapped in consequence. Some soft coal is coming by rail, but Illinois shippers are reported to be 10,000 tons behind in deliveries here. Little hard coal is received by rail at present.

Coke is plentiful, but the demand is unsatisfactory. Cargo receipts by Lake thus far aggregate 705,710 tons of anthracite and 2,552,905 tons of soft coal, a gain of 165,839 tons of the former and a loss of 421,491 tons of the latter compared with the receipts during the same period last year. Fires are smoldering in some of the coal yards along the Menomonee River, but thus far no serious damage has been done.

ST. LOUIS

Unusual prices prevailing on account of the expected strike. Some railroads confiscating coal. Practically no coal on the market and a good demand for everything. Car shortage continues. Railroads using cars for storage purposes. Conservatives do not believe there will be a strike.

The local situation is a trying one. Buyers believe there is going to be a strike in the coal industry, but conservative coal men differ with them, thinking that the Government will take a hand at the last minute and order the miners to stay at work pending an adjustment.

In the Carterville field a fairly good supply of cars is furnished, except on the Missouri Pacific, where arbitrary action is curtailing the production of coal. Unless the mines furnish railroad coal they do not get cars, and if by chance they should load out commercial coal it is promptly confiscated.

The Illinois Central furnishes a pool car supply, but is not arbitrary about it. The other roads are doing fairly well and conditions are satisfactory in this field. In the Du Quoin field, where the Illinois Central supplies the equipment, operations work only two or three days a week. There is a good demand for everything produced. In the Mt. Olive field good working time is reported, that is, about four days a week, with a heavy tonnage moving north and west. Screenings in this field are not so active as they might be. The railroad tonnage is heavy. In the Standard field a heavy railroad tonnage is moving, but car supply is about three days per week average on all roads. There is a market for everything produced here.

In St. Louis proper only a few cars of anthracite are moving. No smokeless has arrived and nothing from Arkansas, but a plentiful supply of Mt. Olive and Standard is on hand, which will last from one to two weeks in the event of a strike. The tonnage of Carterville is extremely light.

The Carterville and Franklin County prices on domestic sizes are all sizes \$3.25@3.40, and screenings are from \$2.15@2.35. Mine-run is from \$2.45@2.65. Mt. Olive coal is from \$2.65@3 for the domestic sizes, and screenings are anywhere from \$2@2.25. Standard 6-in. lump is \$3.25, the same as 3x6 egg. Two by six egg and 2-in. lump is \$3. Mine-run is about \$2.50 and screenings are from \$2@2.25.